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PART 1.

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**PATHOLOGICAL AND ANATOMICAL RESEARCHES ON THE
INFLAMMATORY CHANGES OCCURRING IN THE INTRA-
OCULAR TERMINATIONS OF THE OPTIC NERVES AS A
CONSEQUENCE OF CEREBRAL DISEASE.**

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THE following pages contain the results of a series of investigations which were for the most part made during my residence in London in the winter of 1869-70, when I had the opportunity offered me of carrying them on in the laboratory of Dr. Bader. I was the more inclined to accept the offer he made, that I should especially study the pathological anatomy of optic neuritis, because Dr. Hughlings Jackson at the same time very kindly placed at my disposal his valuable and extensive material; and I thus had the opportunity of examining with the ophthalmoscope a great number of cases coming within this category, and of learning at the same time the views of a colleague so distinguished in this branch of ophthalmology. I obtained some of the materials for my re-

searches through the kindness of Dr. Bader (Cases I, IV, V, and VII), whilst for some I am indebted to the goodness of Dr. Hughlings Jackson (Cases II and VI), and of Dr. Andrew (Case III). I must not omit to render my best thanks to these gentlemen, and especially to Dr. Bader, for frequent assistance in carrying out this work. As regards the clinical notes, it must be confessed that in some of the cases they are not so complete as I could desire. The very chronic course of the morbid processes, and the wanderings of the patients from place to place, will easily explain this. However, they are sufficiently complete to serve as an introduction to the pathological anatomy of the preparations.

CASE I.

Thomas A., æt. 43, admitted into Phillip Ward, Guy's Hospital, under Dr. Rees, December 1st, 1869.

History.—He says he was quite well till 18 months ago, when he first experienced an odd feeling in his head and chest, "his heart seeming to rise into his mouth," followed quickly by a slight faintness or loss of consciousness.

From the first these attacks came on twice or three times daily, but they soon increased in frequency; he was, however, enabled to continue his work. Seven or eight weeks ago the character of the symptoms changed, he woke up one morning with severe pain in the head, which increased for a day or two, and was then followed by the shooting pain, of which he now complains. He has had at times retching and nausea, but not actual vomiting. Bowels regular. Vision sometimes deficient. Hearing good.

P.S. He has severe shooting pains now in one part, now in another part of the head; he has had scarcely any sleep for the last eight weeks; he complains of nothing else, but has constantly an anxious expression of countenance due to the cephalalgia. On inquiring about venereal disease, he owns to a sore on the penis, but denies having had eruption or sore throat. The inguinal glands are a little enlarged and indurated, but chiefly those below Poupart's ligament.

Ophthalmoscopic Examination.—Both optic discs—extreme hyperæmia, with venous hyperæmia of the retina; arteries small.

December 15.—Optic discs seem covered almost entirely by irregular whitish patches, which project a short way along the larger retinal vessels.

December 22.—Has complained of head-pain throughout; is getting very much weaker, perhaps more so on the left side. Right side of the face appears to be drawn up. Has spoken little—is roused to take food.

December 23.—Died.

From Dr. Moxon's Report of the post-mortem Examination.—“Cranial bones remarkably thin and diaphanous. Dura mater natural. Proper membranes dry on surface from swelling of the brain; no lymph anywhere.

“A large tumour was in the right middle lobe at its anterior end and lower surface, so that in the middle fossa it was adherent; the surface was torn in removal. It swelled greatly this part of the brain and pushed the other parts aside; lengthened and pushed to the left the infundibulum; flattened the optic tract and peduncle; pushed up and covered corpora albicantia and parts about the floor of the third ventricle; flattened the right third nerve to $1\frac{1}{2}$ width of the left; thrust back the right side of the pons so that here the pons measured $\frac{6}{8}$ in., but its left side measured $\frac{9}{8}$ antero-posteriorly; pressed on the third root of the olfactory nerve and on the under part of its commissure, so that these were thrown to a right angle with the rest of the course of the olfactory commissure. It was not adherent to any other part than that stated, and there were no signs of inflammation around it. The adhesions appeared due to pressure and implication in the outskirts of the growth. Section showed the disease to consist of a large irregular mass, like in appearance to clotted blood in various stages of transformation. Thus a piece of the size of a walnut was blackish brown and reddish brown, the colours variously mingled. In the black patches the appearance was quite of recent clot. Other parts near the greatest patch were of yellow colour and almost cheesy appearance, but moister, fleshier than ordinary cheesy gummata, more like yellow clot. Around all the tumour (which was as great as an orange) was a brightly injected vascular zone, in which some veins were very

large and tortuous. This zone, generally $\frac{1}{2}$ in. wide, was ductile and juicy, but not very lacerable. Outside it was an indeterminate area, say 2 in. on the average, of yellow softening."

Anatomical Examination of both Eyes.

The posterior half of each eye, with its optic nerve, was given me for examination. There was nothing abnormal externally in either of the globes. The length of the right optic nerve was 2.5 cm. (about 1 inch), and that of the left 3 cm. ($1\frac{1}{2}$ inch nearly). The size, colour, and consistence of both nerves appeared perfectly normal all through their course. Only where they pierced the globe the sheath appeared slightly wrinkled. Transverse and longitudinal sections through various parts of both optic nerves exhibit everywhere a perfectly normal arrangement of the nervous and connective-tissue elements. Teased-out preparations also displayed completely normal nerve-fibres. Treated with chloride of gold, and by carmine-tinting, the reactions were just as normal.

Right Eye.—The optic disc and its immediate neighbourhood appear prominent, and the retina has here an uneven, irregular, and somewhat rough appearance. Sections through the peripheral part of the optic nerve, optic disc and retina, show that the distance of the highest point of the retina from the lamina cribrosa is 2 mm. (.079 inch), and the thickness of the retina, measured from the commencement of the choroid measures 1.2 mm. (.047 inch). The swelling extends itself to a distance of about 2 mm. (.079 inch) from the beginning of the choroid, around the optic entrance, and then somewhat suddenly and steeply declines to the normal thickness. The diameter of the intra-ocular termination of the optic nerve (optic disc) amounts to 1.6 mm. (.063 inch) at the level of the choroid. Closer examination shows that the swelling in the region of the disc and the contiguous parts of the retina is caused by a thickening of the layers of nervous tissue (nerve-fibres). As this somewhat mushroom-like swelling ex-

tends itself all round, the remaining layers of the retina are pushed somewhat towards the periphery, so that they cannot well be measured till about from 0.3 to 0.5 mm. (.012—.019 inch) from the beginning of the choroid (Fig. I). This swelling is almost entirely caused by degeneration of the nerve-fibres. The several fibres are indeed very considerably thickened, their contours are very evident, with varicose swellings (beaded), and they have dark, finely-granular contents. This thickening extends partially over a considerable length of the nerve-fibres (Fig. III), whilst in some parts it is interrupted by thinner portions. On account of the latter circumstance we occasionally get beautiful figures of somewhat spindle-shaped, and pearl-necklace like fibres (Fig. II). If these are not isolated, they give to the whole of the layer, or at least to the part in which they are most abundant, an appearance as if the tissue were interspersed with finely granular cells. This occurs most commonly in the middle part of sections which do not traverse the longest diameter of the optic disc. It is particularly here that transverse sections of the thickened nerve-tubes, and especially of their dilated portions, give to the tissue the appearance of being rich in cells; yet undoubtedly their varying size, their want of nuclei, as well as what we learn from teased-out preparations, guard us from making such a mistake. These changes can be demonstrated in all the layers of thickened nerve-fibres, but they are most strikingly evident towards the interior, and in parts lying just above the commencement of the choroid. In some parts we find there are nests of large, usually yellow-tinted, spheroidal figures, which generally resemble cells, and sometimes a round nucleolar figure is discoverable in their interior. However, when they are isolated, they are found to be provided with one, or very often two, frequently very thick continuations, or tail-like processes (Fig. IV). Their contents, which usually look homogeneous, when examined with a low power, appear finely granular when explored

with No. 9 of Hartnack's immersion lenses. These nests are the white patches, or "plaques" which are seen so vividly with the ophthalmoscope. They chiefly implicate the innermost layers of the nerve-fibres which are nearest to the vitreous, but in some spots they can be traced as far as the choroid. The changes mentioned above by no means affect all the nerve-fibres, for in all the preparations a great number of very fine fibres can be demonstrated, which entirely correspond in appearance and behaviour to those nerve-fibres which we usually see in normal preparations. Numerous small vessels traverse the whole region of the swelling. No increase of the interstitial connective tissue, or of connective-tissue cells, and no heaping up of lymphoid corpuscles could be demonstrated anywhere. Only in the intra-ocular termination of the optic nerve (optic disc), in the immediate vicinity of the larger vessels, a few granular, round cells with evident nuclei were visible. In the same region the calibre of the vessels is diminished, whilst simultaneously, both posteriorly in the optic nerve itself, and anteriorly in the optic disc, there are slight funnel-shaped dilatations in the vessels. The exterior and interior sheath, as well as the intervening connective-tissue, do not exhibit any abnormality, even in the immediate neighbourhood of the bulb.

The choroid, and the remaining parts of the globe are normal.

In the *left eye*, with the exception of quite immaterial differences, an exactly similar state of things could be demonstrated.

CASE II.

The notes of this case were taken by Mr. G. Ernest Hermann.

Isaac K., age 55, admitted under the care of Dr. Hughlings Jackson, November 22, 1869.

Has never been laid up before. Has been in the habit of taking spirits freely. A person who came with him said that last evening he had a fit, which lasted about three-quarters of an hour, during which he foamed at the mouth, and "worked" his

left arm and leg and left side of face. [It was afterwards ascertained that he had had pain in the head for six months, and that a day or two before he had had a fit at work, and that afterwards his leg "dragged."] The patient stated that he fell down in a fit about five o'clock, and knew nothing till he found himself in the hospital.

On admission there was no paralysis of any ocular muscle. Either eyeball might be rubbed without inducing contraction of orbicularis, or apparent uneasiness. Face slightly drawn to left. When told to screw up his eyes, he screws up the left more tightly than the right. When told to elevate the eyebrows, the left is more elevated than the right. Tongue protruded to right. Paralysis of the right arm, with a disposition to rigidity. Can move right leg a little; left arm and leg readily. Action of intercostals cannot be watched, as patient is very fat. Epigastrium sinks in, and abdominal walls fall outwards at beginning of inspiration. Costal angle very obtuse. Respirations, 24 per minute, chiefly thoracic. Temperature, 100° F. Cardiac dulness extends above to third rib, on the right to midsternum on the left to nipple. Apex beat cannot be felt; no murmur. Arteries hard and cordlike. No arcus senilis. Passes urine and fæces in bed; urine contains no albumen.

November 23.—No movement in right arm; no rigidity. Face more drawn; tongue more protruded to left, covered with white creamy fur. Epigastrium does not sink in inspiration so markedly as last night. Seems partially unconscious; speaks thickly; seems to take a long time apprehending questions, but answers rationally. He has not much movement in right leg, but says he can move it better than last night. Urine, sp. gr. 1024, acid; no albumen, lithates. Temperature, 100°.

November 24.—Can move leg a little, but not hand. Epigastric movement much the same. Head inclined to right; eyes not inclined any particular way.

November 26.—Can move right arm but slightly to-night, which he could not do before. Tongue covered with creamy fur. Breathes noisily, but without stertor. Epigastric sinking not so marked. Talks slowly and thickly, and apparently with effort, but sensibly. Temperature in left axilla, exposed, 97°. Pulse, 38. Respirations, 26.

November 27.—General condition about the same. For the

first time the ophthalmoscope was used by Dr. Hughlings Jackson. The left eye was normal. The right disc was not defined, the redness of the fundus seeming to extend to the very entrance of the vessels; the veins large and slightly tortuous. There were no effusions of blood.

December 9.—There were now seen linear smears of blood parallel with veins about the position of the edge of the disc, which was not visible. In the position of the disc were several irregular white patches. One large vein seemed for a short distance to be enveloped in blood—as it were turned into a short column of blood. The left disc was still normal. The left sixth nerve was paralysed, this having come on since last note.

The patient remained in the same condition as regards the paralysis until his death on January 14th, 1870. Nothing abnormal was discovered in the fundus of the left eye. He became gradually more and more comatose. His temperature was taken daily by Mr. Hermann, but was never higher than 99° , except on January 13th and 14th. It was sometimes as low as 97° , and on one occasion Mr. Hermann found it to be 94° . On January 13th, it was 100.9° , and on the 14th, five hours before death, it was 104.4° . Two hours *after* death it was 101.7° .

Autopsy. January 15, 1870.—There was an undue amount of subcutaneous fat, and the cellular tissue over the pericardium was beset with it. The heart was small. Its right cavities contained fluid blood in which no trace of clotting was discovered. In the left side was a trifling quantity of blood. There was fatty accumulation about the heart. Except for atheroma of the valves, the heart was normal. There were a few trifling adhesions of the pleura on the right side, but no fluid in either of the pleural cavities. Both lungs were anteriorly very emphysematous. The dependent part of the *right* lung was slaty black, non-crepitant, except at its margins, and pieces of it sank in water. It was not firm nor unduly soft. There were no patches, the coloration being uniform. The emphysematous parts were, in section, pale.

The left lung was more bulky, not obviously collapsed in any part, and its section was studded by black, well margined patches of varying size from that of a sixpence to that of a shilling—two or three being on the surface. There was scarcely any nodulation to be felt in handling the lung. This lung, except its emphysematous part, was very easily broken down by pressure.

The liver was of a dark colour. The large veins exuded much blood on pressure.

The spleen was flaccid, and weighed seven and a-half ounces.

The kidneys were healthy.

In the left hemisphere there was a large gliomatous tumour, which involved the hinder part of the corpus striatum and part of the optic thalamus, and extended at one point close to the grey matter of the convolutions of the upper margin of the Sylvian fissure. The peripheral parts of the tumour were bluish black in colour, and were not marked off from the rest of the brain. The section of the central part of the tumour was of a pale yellow colour, marked here and there by redder parts.

The specimen was required for the museum, and thus no further examination was attempted. Subsequently, however, it was decided not to preserve it, and further examination of it was made when it had been some time in spirit. It was then seen that the mass lay chiefly betwixt the corpus striatum and thalamus and the convolutions, and involved very little of these parts of the motor tract. There was, however, much softening of the lower part of them, but whether this was pathological or owing to decomposition, was not ascertained. The rest of the brain was normal.

Nothing was found to account for the paralysis of the left sixth nerve. It was traced in its course to the orbit by Mr. MacCarthy.

Dissection of the two Eyes.

The posterior halves, with the optic nerves attached, were reserved for examination. Both globes appear of normal size and shape. The left optic nerve is 2.8 cm. (1.1 inch), and the right 3 cm. (1.2 inch) in length. Close inspection of the optic nerves revealed the following changes. The right, in its whole length, appears thicker than the left. Its thickness increases steadily towards the globe at its central end; that of the right optic nerve amounts to 5 mm. (0.197 inch), and that of the left to only 4 mm. (0.158 inch), across their longest diameter. Close to the eye the thickness of the right optic amounts to 8 mm. (0.32 inch), whilst the left is only 5 mm. (0.197 inch). In cross sections at the peripheral end it appears that the thick-

ening principally depends upon an increased volume of the outer and inner sheaths. At a distance of about 1.5 cm. ($\frac{6}{10}$ inch nearly), and up to the eye itself, this considerable thickening is chiefly caused by an irregular bulging dilatation of the external sheath. Transverse sections in this region show that the optic nerve itself, which has here a thickness of about 4 mm. ($\frac{158}{100}$ inch), is connected with the walls of the external sheath only by a small quantity of fine, spongy (locker) areolar tissue, so that a hollow space is formed around the nerves by the dilated sheath (Fig. V). This hollow space diminishes in extent posteriorly towards the centre, and is completely lost at a distance of about 1.5 cm. ($\frac{6}{10}$ inch nearly) from the eye, so that the nerve itself is pretty closely invested at this part by the sheath. A transverse section through the optic nerve of the other (left) eye shows the sheath everywhere closely investing the nerve.

As regards their size, colour, and consistence, the nerves themselves, both at their peripheral and central ends, exhibit no macroscopic (naked-eye) deviations from the normal. On a closer examination of the optic entrance and of the retina of the right side, we find as follows:— From the point where the vessels enter, which is marked by a slight depression, a slight annular swelling comes into view, which extends, with gradually diminishing intensity, somewhat over the margins of the disc. The retina, which is here, as indeed everywhere, tinged yellow by chromic acid, exhibits a rough and somewhat dull appearance, and in this region numerous small punctiform spots of more lustrous appearance show themselves, with a few reddish streaks. The vessels cannot be traced from the periphery to their entrance, their calibre is considerable, yet no decided tortuosity can be demonstrated. Thin transverse sections through the central ends of the optic nerves of either side exhibit nothing abnormal, even at a distance of 5 mm. ($\frac{197}{100}$ inch) from their entry into the eye. Preparations made by teasing allow well-developed

nerve fibres to be clearly recognized. The connective tissue between the different nerve bundles appears unaltered, only on the right side it frequently gives the impression as if in many spots it was interspersed with more nuclei than on the left side. Transverse sections through the optic nerve and its sheath, through the choroid and the retina, give the following results:—Whilst on the left side the external sheath closely invests the optic nerve, it is clearly separated from it on the right side by a loose tissue. The latter increases in thickness (density) towards the optic entrance. The proper intra-ocular portion of the optic nerve appears on the right side somewhat tapering, so that a transverse section at the level of the choroid only amounts to 1·8 mm. (·09 inch), whilst that of the left eye equals 2 mm. (·079 inch). The optic disc itself, and the adjacent part of the retina, are very prominent. (Fig. V.) The distance of the highest point of this from the lamina cribrosa is 1·75 mm. (·069 inch) on the right side, whilst in the left eye it is a little more than 1 mm. (·039 inch). The thickness of the retina above the commencement of the choroid also amounts to 1 mm. (·039 inch). The prominence slopes gently towards the periphery, so that at a distance of 5—6 mm. (·19—·20 inch) from the entrance of the vessels it is almost invisible. Thin transverse sections of the left side show nothing abnormal. We learn from a microscopic examination that the swelling of the right side is chiefly due to a thickening of the nerve fibres, with occasional occurrence of varicose dilatations. The contents of these are finely granular. Along with these there is a moderate number of free nuclei, which are most numerous in the very centre of the disc. The dilatations of the fibres (nerve-tubes) generally give the appearance of nuclei, and these give one the impression that a free nucleus is attached to the fibre. But when the object is isolated, and a rolling movement communicated to it by pressure on the covering-glass, we can easily convince ourselves as

to their true nature (Fig. VI). Besides the changes just described, the swelling was also due partly to the dead white patches (plaques) seen by the ophthalmoscope. They are made up by an accumulation of very large, and generally spherical figures, which often have two tails or processes (Ausläufer). By teasing out, these can be isolated, and sometimes so perfectly that they give the impression of being independent cells, with a nucleus in each; we learn, however, from other parts, that they are connected with thickened nerve-fibres, and that they must therefore be considered as a sort of ganglion-cell degeneration of the nerve-fibre (Fig. IV). They are chiefly found in the inner portion of the nervous layers, but occur also in the region of the disc in the deeper layers, and even sometimes a little below the level of the choroid. Along with this degeneration the tissue is also found interspersed with numerous extravasations of blood, which are chiefly found in the internal layers of the nerve-fibres. The remaining layers of the retina are somewhat extended from their normal point of origin, and take their origin at some distance from the scleral confines. In all other respects they are clearly distinguishable, and exhibit no particular deviation from the normal. Numerous capillary blood-vessels traverse the discs and their immediate neighbourhood. Down to the lamina cribrosa no alteration in regard to thickness or disposition of the normal connective tissue fibres, or of their contained nuclei is demonstrable. The connective-tissue of the internal and external sheath in the neighbourhood of the globe is much thickened, and arranged in coarse bundles, with wide meshes. The internal sheath appears unaffected, whilst, on the other hand, directly beneath the lamina cribrosa, and from thence to a distance of about 2 mm. (.079 inch) towards the centre, the interstitial connective-tissue which is met with is interspersed with numerous small round or oval finely granular nuclei. The retina at some distance from the disc, as well as the whole of the choroid, appears normal.

In the left eye no morbid changes could be demonstrated in any part.

CASE III.

John D., æt. 39. Accurate clinical notes of this case are unfortunately wanting. On the 29th January, 1870, I had the opportunity of examining this patient with the ophthalmoscope whilst he laid comatose, with complete hemiplegia of the left side. Both optic discs were greyish-red in colour, moderately swollen, and their margins muddy and indistinct. Here and there the vessels on their margins appeared tortuous. On the whole the retinae showed pretty considerable venous congestion, whilst the arteries seemed relatively small. There was no striking tortuosity of vessels demonstrable. A further examination on the 5th February, 1870, showed that the swelling of the discs was somewhat diminished, and their scleral borders were now visible, though rather indistinctly. The vessels were as before.

The post-mortem on the 8th of February, 1870, showed flattening of the convolutions, muddy opacity of the pia-mater, and in the middle of the right cerebral hemisphere there was a centre of softening (*Erweichungsheerd*) about the size of a small apple, containing a small tumour ($\frac{1}{3}$ rd of an inch in diameter), which sprang from the dura-mater, and extended into the middle lobe of the right hemisphere of the brain. The optic nerves, where they entered the optic foramina, were of normal white colour, and their sheaths did not appear at all dilated. There was also carcinoma of the right lung. Only the posterior half of the right eye was removed for examination.

Anatomical Examination of the Right Eye.

2·5 cm. (1 inch nearly) of the optic nerve had been preserved. The central end was normal as regards size, colour, and consistence. Directly behind the globe it began to be thickened, which at a short distance from the eye amounted to from 6—7 mm. ($\cdot 20$ — $\cdot 27$ inch). It showed fluctuation clearly, and on section exuded a turbid fluid, which contained a great number of round, granular cells, very evidently nucleated, and also free nuclei.

Transverse sections showed plainly that the thickening was due to a dilatation of the outer sheath. The latter was attached to the inner nerve sheath by wide-meshed connective-tissue. The limits of the intra-ocular termination of the optic nerve (optic disc) could be clearly recognized, as well as the vascular twigs proceeding from it, after the removal from the corpse.

Transverse sections of the hardened preparation showed a somewhat deep physiological excavation in the centre of the disc. The retina in its vicinity was thickened. Above the commencement of the choroid the retina measured 0.66 mm. (.026 inch). The distance of the highest point of the same from the lamina cribrosa was 1.33 mm. (.053 inch). The diameter of the optic nerve at the level of the choroid was 2.15 mm. (.085 inch).

Thin transverse sections through the central end of the optic nerve did not exhibit any microscopic changes. The arrangement of the nervous and connective tissue elements was quite normal. Teased-out preparations showed well-formed nerve fibres. The chloride of gold and carmine reactions were also quite normal. Near the eye, where the above-mentioned dilatation of the sheath occurred, the tissue of both sheaths was somewhat looser, and the intermediate connective-tissue a little increased and thickened. At the same time a considerable number of delicate round granular cells were found. Microscopic examination of the retina, and of the intra-ocular termination of the optic nerve showed a swelling of the tissue of the optic nerve-fibres, so that this was elevated above the plane of the choroid in a somewhat mushroom-like manner. The remaining layers of the retina were, therefore, somewhat pushed out of place, and took their origin at a distance of about 0.45 mm. (.017 inch) from the commencement of the choroid. The thickening of the layers of nerve-fibres extends a little more than 0.75 mm. (.029 inch), and from this point declines somewhat abruptly to the normal thickness. The physiological excavation is deep,

and abruptly margined. The central vessels were evidently compressed in the scleral plane, and began to dilate from this point on both sides in a somewhat funnel-shaped manner. In the spot where the layers of nerve fibres were thickened, there were found a moderate quantity of evidently swollen nerve-fibres, some of which were spindle-shaped, whilst others showed a manifest thickening in their whole length, with finely granular contents (Fig. VII). Amongst the latter one saw in many spots their contours irregularly broken. The same tissue was found interspersed with round or oval, finely granular elements of varying size, which were most numerous in the zone of nervous-fibre layers situated most internally, and indeed chiefly in those sections which were not made through the longest diameter of the disc. A closer examination shows that the nuclear appearance of these sections was due partly to the presence of free nuclei, and partly to the cutting across and dilatation of the nerve-fibres themselves (Figs. VII and VIII). Indeed these dilatations generally gave one the impression that they contained a finely granular nucleus. This was, however, brought about by the above-described unequal bulging-out of the nerve-fibres themselves. Their behaviour can very easily be studied in isolated fibres, if one makes them revolve slightly by gentle pressure on the covering-glass, and they are thus made to present themselves in various positions. Accompanying these degenerated nerve-fibres there were, however, a great number of well-formed ones. The vessels in the region of the disc were very numerous. No increase of the connective-tissue could be demonstrated in the region of the disc, whilst on the other hand, in the vicinity of the lamina cribrosa, the nerve-bundles were surrounded with somewhat coarser and more abundant tissue. The rest of the retina, and the whole of the choroid, were normal.

CASE IV.

February 12, 1868.—Mary Jane P., æt. 20. Parents both

healthy; has been employed for the last four years as a nurse-maid. Up to 12 months back has been always well and active. About 6 months ago, when in service and staying at the seaside, she was attacked, after bathing in the sea, with shivering and illness, and suffered from what she called neuralgia. She had an attack of jaundice, but of very mild form, and from that time to the present the menses have been suppressed. She has been gradually getting weaker, but has not lost power in any particular limb; has had no sickness or fits.

About 3 months ago the eyes first began to be affected. It commenced by indistinct vision, which was at first noticed in the left eye. She says that the flame of a candle was murky and hazy, and that in the children's copies one line became confused with another. She had very little sleep, pains in the temple, and complained more during the last 3 months of giddiness. Seven weeks ago she was so bad as to be obliged to leave her place, during which time there have been, she says, temporary improvements in vision, which were simultaneous with the relief of the cerebral symptoms, but were only of short duration.

Ophthalmoscopic examination.—Slight hypermetropia, optic disc swollen, whitish and ill-defined; arteries scarcely visible, veins few in number and thin in optic disc and retina. Same state in both eyes. Patient was then removed from the ward and died 5 weeks afterwards. The post-mortem examination took place in the house of the patient.

Notes obtained from Mr. Hallam.—Brain convolutions flattened; at the inner side of the right posterior lobe of the cerebrum was a cauliflower-like growth, resembling brain matter covered with bosses (glioma). Base formed by right half of cerebellum and optic thalamus and part of white matter of posterior lobe of cerebrum. Tumour pressed forwards into the right ventricle, pressing its walls into close apposition. Tumour pyramidal in shape $2\frac{3}{4}$ inches at base, $2\frac{1}{4}$ inches high.

Anatomical Examination of the Two Eyes, with their Optic Nerves.

The left eye was entire, with 3.5 cm. (1.379 inch) of the optic nerve; whilst one-half of the right globe, with

3 cm. (1.18 inch) of its optic nerve, was sent me for examination.

At a distance of 2.5 cm. (1 inch nearly) from the globe, the longest diameter of both nerves was 5 mm. (.196 inch). This decreased somewhat on both sides towards the eye, so that at a distance of 1.5 cm. ($\frac{6}{10}$ inch nearly), it only amounted to 4.5 mm. (.177 inch). At this point again, on both sides, a considerable thickening commenced, which gave both nerves before their entrance into the globes a sort of fungiform appearance. The longest diameter, at a distance of 3.5 mm. (.138) inch from the right eye, equals 6.6 mm. ($\frac{1}{4}$ inch nearly), of this 3.5 mm. (.138 inch) belongs to the optic nerve itself, whilst the rest is made up by the sheath, and a loose, intervening connective-tissue. Transverse sections, through the central ends of both optic nerves, show the nerves themselves to be perfectly normal as regards their delicate structural conditions. Well-marked nerve fibres could be easily demonstrated by teasing with needles, and although chloride of gold and carmine reactions did not show their accustomed beauty in preparations which had been so long preserved, yet they reacted sufficiently to convince me that the fibres were perfectly normal. At the spot where the nerve-sheath began to be dilated, the inter-vaginal connective tissue is slightly increased, and the separate fibres are somewhat crowded together. This was more marked towards the globe, and attained its greatest development in the thickest part of the optic nerve. Numerous, finely granular, rounded cells were also met with amongst the meshes of the fibres of connective-tissue, along with a delicately nucleated coagular material. Both the sheaths, internal and external, exhibit thickening, and at the same time their tissue is looser.

In the left optic nerve itself there are a large number of interstitial nuclei, at the same time the connective-tissue in some parts, especially in the vicinity of the vessels, is increased, and interspersed with numerous round

and spindle-shaped cells. These changes, which begin at a distance of about 3 mm. ($\cdot 12$ inch) from the globe, occur also, especially in the course of the vessels, in the intra-ocular termination of the optic nerve (optic disc) and in the retina itself. The distance of the highest point of the optic disc from the lamina cribrosa amounts to 1.4 mm. ($\cdot 055$ inch). In the disc itself, at the point where the vessels emerge, there is a very evident (*mächtige helle*) increase of the connective tissue, which is interspersed with numerous nuclei. The rest of the intra-ocular portion of the optic nerve (optic disc), from the lamina cribrosa, was chiefly composed of a network, consisting of fibres, of varying thickness, in which, along with occasionally granular contents, there occurred numerous rounded or oval nuclei. These were usually the size of a red blood corpuscle, but were often indeed as large as a colourless blood-corpuscle. They were very evenly distributed all over this reticular tissue, and were in the vicinity of the vessels, where indeed the great increase of connective-tissue was much less evident. Teased-out preparations in this region show that a considerable number of evidently hypertrophied nerve-fibres were demonstrable amongst the normally developed ones. This thickening sometimes involved a considerable length of the fibres; sometimes the dilatations were varicose (beaded) or club-like. These fibres had finely granular contents. Their contours in many parts were indistinct and broken, and the dilatations of the fibres very frequently gave one the impression of having a very distinct nucleus within them (Fig. VIII). If, however, the fibre was observed whilst in movement, especially in rotation around its long axis, it was easy to convince one's self that this was simply due to a swollen portion, which, in a certain position, simulated a nucleus. The layer of nerve-fibres in the vicinity of the disc is just as evidently affected, being principally composed of a rather loose-meshed tissue, with delicate fibres running longitudinally. The meshes are also arranged longitudi-

nally, and contain numerous, finely granular cells, with free nuclei. These occur also in the ganglion-cell layer, along with some degenerated ganglion-cells. The thickness of the layers, which in the region of the optic sheath, on account of the numerous vessels, and the surrounding increase of connective-tissue, amounts to nearly 1 mm. (.0394 inch), speedily diminishes considerably, till it equals only the thickness of 0.05 mm. (.002 inch). The choroid also appears implicated in this process, at least its tissue shows an evident decrease of pigment cells, and in consequence of this a considerable number of rounded cells, which extend all through this membrane, in the neighbourhood of the disc. In the layer of the sclerotic nearest the choroid, cells, evidently containing pigment, were easily demonstrated, as well as diffused pigment. Both eyes were affected in a similar manner.

CASE V.

Miss H——, æt. 48.

This case is extremely interesting, because failing sight was the first symptom which indicated any disease at all. Dr. Bader, who was consulted for this two years before, was able to recognize on both sides well-marked optic neuritis (*Stauungs papillæ*, hyperæmia of the discs). He had the patient under observation for some months, and during the whole of this time there was no other symptom at all to indicate cerebral disease. These symptoms did not supervene till a later date, when they announced themselves by paralytic phenomena, which involved all the left side of the face and the left half of the body. Dr. Bader procured me the opportunity of examining this patient with the ophthalmoscope sixteen days before she died, with the following result:—"Both discs appear somewhat swollen, of greyish-white colour, with a very slight tinge of red; their borders are rather indistinct, and some shiny streaks, parallel with some of the vessels, can be seen near the margins of the disc. The veins are well marked; the arteries, on the contrary, are somewhat small." No particular tortuosity of vessels was discovered. The amaurosis was complete.

Death occurred on the 26th April, 1870. The post-mortem examination took place 18 hours after, and I was allowed to examine the brain.

On removing the calvaria, nothing abnormal was evident, except great congestion of the convex surface of the brain; the sinuses were moderately congested. At the base of the brain there was found a tumour the size of a hen's egg, with well-marked fluctuation. It lay in the situation of the anterior inferior lobe of the left cerebellum, by the side of the medulla oblongata, and pushed the left crus cerebelli upwards, against the pons varolii, and displaced the posterior lobe of the cerebellum in an upward direction. The tumour consisted of two portions; the posterior and firmer part was of the same consistence as the cerebellum, and was irregularly nodulated in parts; the anterior and smaller fluctuated most markedly, and had smooth thin walls. The tumour was very easily detached, and the whole cerebellum was seen to be well developed, but somewhat pushed out of place, and the surface of the medulla oblongata also showed a depression on left side. The 5th (Trigeminus) nerve, considerably elongated and flattened, wound round the outer side of the tumour. The tumour was connected with the directly superincumbent parts by a very easily lacerable tissue; its lower surface was partially so, corresponding to a corroded, rough, and irregular bony surface. The long diameter was 6 cm. (about $2\frac{1}{3}$ inches), and its greatest width 4.7 cm. ($1\frac{9}{10}$ inch nearly), whilst its depth was 3 cm. ($1\frac{1}{2}$ inch, nearly). Through the displacement of the left lower lobe of the cerebellum, the crus cerebelli ad pontem of that side appeared considerably elongated. When the tumour was cut into, there appeared in the anterior part a smooth-walled cyst, 2.4 cm. ($1\frac{2}{3}$ inch, nearly) in length, and 2 cm. (about $\frac{3}{4}$ inch) broad, full of a clear fluid. A similar, but smaller one, existed posteriorly. The cut surface of the tumour itself exhibits a very mottled appearance; yellowish-white, or transparent-grey, and reddish spots mingled together. The whitish parts seemed to be of firmer consistence than the transparent ones. The addition of acetic acid produced no macroscopic changes. Except a slight dilatation of all the ventricles, no other abnormality was met with in the brain.

The microscopic examination of the tumour showed a spindle-celled sarcoma, which had undergone partial fatty degeneration.

Anatomical examination of the Eyes with their Optic Nerves.

Both globes were preserved entire, in spirit. As regards their size and shape, nothing abnormal was remarked. The right optic nerve had been cut off at a length of 1 cm. ($\cdot39371$ inch = $\frac{4}{10}$ th inch nearly), and the left was 1.2 cm. ($\cdot473$ inch = $\frac{1}{2}$ inch nearly) in length. The nerves themselves are very thin (longest diameter = 2.8 mm. = $\cdot11$ inch) and of a pale, greyish-red colour; in both the external sheath is very much dilated and thinned, so that it hangs about the nerve like a loose sac (Fig. IX). Between the outer and inner sheaths, a tolerably thick and regular soft connective-tissue is met with. The circumference of the outer sheath amounts to 1.5—1.7 cm. ($\frac{6}{10}$ — $\frac{2}{3}$ inch nearly), at a distance of about 1 cm. ($\frac{4}{10}$ inch nearly) from the globe.

The right eye was divided into two halves by a horizontal [? vertical] section. The anterior part of the eye and the vitreous appeared perfectly normal.

The optic disc is irregularly swollen, and elevates itself 1 mm. ($\cdot0394$ inch) above the plane of the choroid. The swelling somewhat abruptly descends at a distance of about 2— $2\frac{1}{2}$ mm. ($\cdot0787$ — $\cdot02985$ inch) from the entrance of the vessels, into the retina. The diameter of the optic nerve at the level of the choroid amounts to 2.2 mm. ($\cdot0866$ inch). In cross-sections through the optic nerve, at a distance of 1 cm. ($\frac{4}{10}$ inch nearly) from the globe, the connective-tissue through which the nerve bundles normally run, appears greatly thickened and interspersed with numerous nuclei; the unattached meshes between these are filled up with a delicate nucleated tissue which abounds in numerous finely granular nuclei, and very thin, often broken and pale fibres. Preparations made by teasing showed no well-developed nerve-fibres anywhere. By soaking in carmine-fluid, the cross-sections acquire a uniform, even, red tint, and chloride of gold did not show any action upon nerve-fibres. The increase of

connective-tissue is most evident in the vicinity of the vessels, and in the inner sheath. The whole length of the nerve was seen to be similarly affected. The part connecting the latter with the chiasma had not been removed from the body. Cross-sections made just in front of the commissure on the right side, however, allow the preceding arrangement of connective-tissue and nerve-elements to be less distinctly recognized. Pale fibres of connective-tissue, of varying thickness, repeatedly interlacing with each other, make up the greater part of the whole tissue, over which are scattered a multitude of large and small nuclei, and cells, and free fat-globules, with a finely granular detritus (basis). Sections behind the chiasma, with the exception of the entrance of the optic tract into the brain-substance, show that the tissue here consists of a delicate fibrillar tissue, with numerous exudation-granules, cells, and free nuclei of varying size, fat-globules, and a finely granular detritus.

At the level of the sclerotic the whole nerve is traversed with a very thick, coarse, fibrous tissue, running longitudinally. This is interspersed with a great number of small nuclei, often closely crowded together; whilst the longitudinal fibres almost entirely disappear. Just above the level of the choroid, this tissue is somewhat abruptly merged into one consisting of pale, somewhat thick, and interlacing bundles. The interlacings, which extend irregularly in all directions, leave very clear, round, or oval lacunæ between them (Fig. X). In these, as well as scattered all through the tissue, is an excessive quantity of nuclei. This tissue extends around the margin of the disc into the thickened retina, and intrudes itself into this, so that it replaces the inner granular layer (Fig. XI). As far as this mass of connective tissue invades the retina, no trace of an inter-granular layer or of rods and cones can be recognized; both, however, are met with at some distance from the margins of the optic disc, very distinct, and to all appearance properly developed. No ganglionic cells

could be met with in any part of the retina. The thickness of the areolar layer is from 0·48 to 0·5 mm. (·0189 to ·0197 inch). Towards the surface of the optic disc these interspaces (Lücken) gradually become smaller, the arrangement of the tissue in bundles is less evident, and is replaced by a delicate, but irregularly-disposed tissue resembling felt, and abounding in granules. Closer examination, especially of teased-out preparations, shows that this is chiefly made up of pale, delicate, and frequently homogeneous, repeatedly broken fibres, mixed with some exhibiting marked dilatations. In some of the preparations from the thickest part of the disc, which was of course the most prominent, thicker fibres, with dark, finely granular contents, and here and there very evident spindle-shaped dilatations, were met with.

The thickness of the retina measured at a distance of 1 mm. (·0394 inch) from the commencement of the choroid, amounts to $\frac{2}{3}$ mm. (·0112 inch), whilst the thickness of the layers of nerve-fibres at this spot is only $\frac{1}{11}$ mm. (·00281 inch).

The result of the examination of the left eye and its optic nerve was closely parallel with that of the right. Only the disc of this was more evenly swollen, and the retinal thickening extended 0·75 mm. (·0295 inch) further in the immediate neighbourhood of the disc than it did on the right side.

CASE VI.

Dr. Hughlings Jackson had this case for a long time under observation, and he stated that the complete atrophy of both optic nerves, which was present during the last part of the patient's life, had been preceded by optic neuritis. There was syphilitic disease of each cerebral hemisphere.

Dissection of the Eyes.

Left Eye.—The eye was entire with 3·7 cm. (1·46 inch) of its optic nerve. The size and configuration of the

globe normal, its consistence very soft. The optic nerve, up to its entrance into the eye, appears of uniform thickness (4 mm. = $\cdot 158$ inch in diameter). The external sheath is very vascular, and in the neighbourhood of the globe is evidently wrinkled. A transverse section through the central, middle, and peripheral ends shows the optic nerve itself (without the sheath) to be very thin, in the central part 3 mm. ($\frac{1}{10}$ inch nearly), in the middle and peripheral (close to the globe) not quite 2·9 mm. ($\frac{1}{10}$ inch nearly) in its greatest diameter. The nerve itself has a greyish-red colour. The red colour is seen on closer examination, and especially when examined with a magnifying lens, to be produced by numerous vessels traversing the proper nerve-tissue. At a distance of 1·2 cm. ($\cdot 473$ inch) from the globe, the usual uniform tint occurs, whilst at a distance of 2 cm. ($\cdot 78$ inch), a whitish spot is seen, implicating the centre of the nerve, which is resolved by a lens into a network consisting of whitish fibres; finally at the central end the whole nerve is almost uniformly made up of the latter tissue. A glance into the interior of the eye shows that the calibre of the vessels is pretty considerable, and that they are rather tortuous. In the immediate vicinity of the disc they seem somewhat obscured, and cannot be traced with distinctness to the centre of the disc. The latter event seems to be caused by a whitish-grey stippling proceeding from the centre of the disc, that extends below, but more especially directly above, somewhat further into the retina. For some little distance the principal vessels are accompanied by clear white patches on both sides (many extending as much as 5—6 mm. = $\cdot 196$ — $\cdot 206$ inch).

The microscopic examination of the optic nerve shows an extremely unusual development of the interstitial connective tissue.

Between the different meshes, which were sometimes plainly visible, there is a finely granular substance. The whole tissue is, as it were, sown with round and oval

nuclei, whilst at certain places, especially those nearest the centre, were a great number of exudation corpuscles. Very numerous vascular anastomoses traverse the whole tissue. In teased-out preparations atrophied nerve-fibres could be demonstrated along with numerous connective tissue and elastic fibres. These changes extended in a precisely similar manner to the intra-ocular termination of the optic nerve. On the other side of the lamina cribrosa there was a very great increase of cells and nuclei, with marked addition to the connective-tissue. The latter is more particularly strongly developed, at the place where the vessels emerge from the centre of the disc, so that the greater part of the disc itself is evidently made up of connective-tissue. This also extends itself somewhat into the retina, along the track of the great vessels. The rest of the disc consists of an irregular delicate fibrillar network, which is filled with a great number of nuclei. Preparations made by teasing, show the tissue to consist here of delicate, sometimes slight, at other times broken, broad, pale, and homogeneous fibres, between which, along with a finely granular detritus, there are a great number of finely granular round, oval, or irregular nuclei. Occasionally broad, ribband-like fibres, with broken outlines, can be demonstrated, with pale, finely granular contents, and they sometimes display at their termination a usually irregular, but strongly light-refracting nuclear outline, of the same size and similar contents to those contained in the remaining tissue. This state of things extends from the margin of the disc into the nervous layers of the retina. The distance of the highest point of the disc from the lamina cribrosa was somewhat less than normal.

The *right eye* with its optic nerve was very similar to the left. Only the obscurity of the optic disc appeared less marked to the naked eye than in the left eye. Microscopically there was very little difference between the two.

CASE VII.

William F., æt. 15. I extract the following notes from a long account of the disease.

The patient was first attacked by pains in the head in January, 1865, along with strong convulsions, with which total loss of sight was very soon associated. In April, 1865, the first two symptoms left him, and the patient found himself comparatively well, until May, 1867. Then the earlier symptoms recurred with greater severity. The patient fell into a comatose condition, whilst there was retention of urine, and obstinate constipation. These symptoms also subsided, from August, 1867, until the patient was again attacked in January, 1868. Very severe pains in the head, tonic and clonic convulsions, sometimes three or four times a day, long-continued vomiting, which generally immediately followed the ingestion of food, were the principal symptoms. There was absolute amaurosis. An ophthalmoscopic examination, made a few days before death, showed on either side white and atrophic discs, the arteries and veins few in number, and of small calibre. Death took place on the 16th March, 1868, during an attack of convulsions.

As regards the results of the post-mortem, I learn from Dr. Bader that a cysticercus was found in the right hemisphere of the brain.

Anatomical Examination of the Eyes.

Both eyes with their optic nerves were preserved for examination. The left optic nerve was 2.2 cm. (0.87 inch) and the right 3.2 cm. (1.26 inch) in length. The globes were extremely hard, owing to long immersion in chronic acid, however there was nothing abnormal externally.

Right Eye.—The long diameter of the optic nerve, which throughout its course presented no remarkable difference in thickness, measured at the middle of its length, amounted to 5 mm. (0.1968 inch). Of this not quite 3 mm. (0.12 inch) belong to the nerve, and rather more than 2 mm. (0.0784 inch) to the sheath. Transverse sections at the central end of the optic nerve show the external

sheath to consist of a thick, stout connective-tissue, the wavy bands of which are extremely well marked. In the inter-vaginal wide-meshed substance, a great number of round and oval cells, and here and there spindle-shaped ones, containing clearly-defined nuclei; and there were free nuclei also. The same elements could be demonstrated in the equally thickened and loosely-formed inner sheath. Transverse sections of the nerve show the whole tissue infiltrated (*lit.* sown over with) an immense number of small, finely granular strongly light-refracting nuclei. In some situations, and this more especially in parts lying near the centre of the nerve, there are found, along with these elements, many large, finely granular dark cells made up of nuclei (exudation-corpuscles). Instead of the proper bundles of optic nerve-fibres, there appears in the peripheral parts of the nerve a network consisting of many delicate and transparent fibres, which, towards the centre, assumes a more wrinkled and intricate structure. The interstitial connective-tissue is coarse, very abundant, and furnished with many capillary vessels. The latter, but more particularly the central vessels, have their walls everywhere considerably thickened. Preparations made by teasing exhibit, in the midst of an intricate detritus, a multitude of the cells and nuclei above described, along with many atrophied nerve-fibres, and stout bundles of connective-tissue. By carmine tinting the whole tissue acquires a lively red coloration. Chloride of gold had no effect on the nerve-fibres. Almost all these changes affect in a nearly similar manner, the entire length of the optic nerve, only in the vicinity of the entrance of the vessels into the eye, the increase of connective-tissue is more strikingly evident, and here the exudation-corpuscles are no longer met with. Transverse sections through the middle of the disc, and part of the optic nerve, show the surface of the former to be very slightly depressed. The thickness of the retina, measured from the commencement of the choroid, amounts to 0.34 mm. (0.0134 inch). The

middle of the disc is composed of a clear transparent connective-tissue. This is very strong, and abounds in spindle-shaped oval, and rounded cells, and finely granular nuclei, and embracing all the capillary vessels. This tapers to a point posteriorly, and accompanies the central vessels in their whole course through the nerve. In a similar manner it pursues the vessels for a considerable piece of the retina (Fig. XII). The rest of the disc consists of a delicate fibrillated tissue, interspersed with an excessive quantity of free nuclei, which extend themselves into the contiguous parts of the retina, and principally implicate the nervous layers of it. At a distance of 2—3 mm. ($\cdot 0784$ — $\cdot 1182$ inch) from the confines of the disc, these elements strikingly diminish in quantity. The layer of nerve-fibres is thinner here than in the normal condition, and consists of only a few fibres running longitudinally. No ganglion cells could be clearly made out in any part of the retina, whilst the remaining layers appeared normal, with the exception of the layer of rods and cones, which had undergone post-mortem degeneration. The part of the optic nerve which is embraced by the scleral-ring (margins of the porus opticus) exhibits a very evident increase of its diameter, in the middle portion. The latter, in particular, exceeds the diameter at the level of the pigment-epithelium of the choroid by 0.03 cm. ($\cdot 012$ inch), and that in the plane of the optic entrance itself by 0.05 cm. ($\cdot 0197$ inch). On account of this the part of the optic nerve surrounded by the scleral-ring assumes a mushroom-like appearance.

This was evident in all the preparations. The choroid and the remaining structures of the globe were normal.

The left eye showed similar changes, with the exception of quite unessential and trifling differences.

The preceding results of dissection show various stages of degeneration in the optic nerve existing in connection

with intra-cranial diseases. I have placed them together, one after the other, in a series which seems to me to correspond in order of time, as far as pathological anatomy enables us to form a judgment, with the stages from the earliest commencement to the final changes induced by the morbid processes. The descriptions have been entirely objective in character, in order that the reader may form his own judgment whilst perusing them. Although, in spite of this, I shall not omit to add a short *résumé* of the views I have formed during this investigation, this is by no means done with the intention of prejudicing or preoccupying the reader's judgment, but only to call attention to some new facts rendered evident by these anatomico-pathological descriptions, and at the same time to point out plainly the points which still require further confirmation. In my opinion the drama of these degenerations is far from being played out yet (die Acten noch lange nicht geschlossen). As regards both the dependence of the affection in question upon the cerebral disease, and in relation to the real nature of the processes themselves, various opinions are still prevalent. Unanimity is wanting, especially as regards the anatomical explanation of the changes demonstrable by the ophthalmoscope, and it is still debated what elementary changes constitute the principal part of these. Were this obtained, we should be able to guard ourselves better from the danger (arising from the varied ophthalmoscopic appearances, partly due to the different stages, partly to unessential phenomena) of drawing the inference that these are equally varied cerebral affections; and we should thus gain the best indication (Fingerzeig) as to how far the process depends upon cerebral disease.

In spite of the very varied ophthalmoscopic appearance in the preceding seven cases, I am compelled to consider all as belonging to one and the same species of morbid degeneration, and to comprise the anatomico-pathological changes in the point of view I am about to describe. In the cases which were examined the earliest, the venous

hyperæmia of the retina, with simultaneous discoloration of the disc, and mushroom-like swelling of the latter, were most strikingly evident. The latter circumstance, which was marked not merely by its height but by its lateral extension at the level of the choroid, is shown best in Fig. 1, which represents a pretty advanced stage of this, and is taken from a preparation from Case I. At some distance from the commencement of the choroid, this merges, sometimes rather abruptly, at other times more gradually, in the normal thickness of the retina. The thickening extends itself only and entirely to the layer of nerve-fibres, and chiefly by its lateral extension displaces the remaining layers of the retina from their normal points of origin. Simultaneously with these changes, one generally finds the central vessels compressed at the level of the choroid. Closer examination of the thickened layer of nerve-fibres shows that the swelling is chiefly due to a change in the nerve-fibres themselves. These present themselves under the form of uniformly thickened, at other times pearl necklace-like, spindle-shaped, or even sometimes as stout club-shaped swellings. One naturally finds these forms in varying amount in different eyes; thus, for example, in the first two cases the club-shaped swellings were present in great numbers, whilst in three cases, in which the swelling of the disc was present in a less marked degree, there was no trace of them present; on the other hand, a moderate number of uniformly thickened fibres was demonstrable. Fig. 2 gives an accurate representation of the spindle and pearl necklace-like thickenings, taken from the borders of a section, and Fig. 4 one of the club-like degenerations from a preparation teased out by needles. The latter generally show a yellowish colour in the section, and are occasionally furnished with an apparent nucleus, of rounded or irregular form. They principally occur in association with extravasations of blood, and exhibit themselves as extremely white patches (plaques) on the retina when seen by the ophthalmoscope.

Under high powers, the contents of the fibres make the impression of being nothing but little drops of fat, yet I could never succeed in obtaining any reaction with ether, which is perhaps to be ascribed to their long immersion in chromic acid solution.

The changes thus described are seen to most advantage in their early stages. After the process has culminated in an advanced stage, retrogressive metamorphosis sets in. This appears to consist in a breaking up of the affected nervous elements, and their consequent atrophy; at least one finds in preparations made by teasing, swollen fibres with broken outlines, such as are represented in Fig. 8, and extremely delicate, often abruptly broken (*gekinckte*) fibres, of very irregular course. Simultaneously with this destruction there is in most cases a shrinking and flattening of the disc; that this, however, does not always occur is proved by Case V, in which, along with perfect atrophy, a very swollen condition of the disc was demonstrable, due to a great increase of the connective-tissue. According to the degree in which the process has implicated the nerve-fibres in any given case, will, naturally enough, depend the successive results of these changes on the faculty of vision.

It is also doubtful what are the shares of the connective-tissue associated with the intra-ocular terminations of the optic nerves and of the blood-vessels respectively, in these morbid changes. To discriminate between connective-tissue and nerve-fibres on the other side of the lamina cribrosa is admittedly an extremely difficult task, and indeed in some cases it is absolutely impossible to say which of the two is before us. Even coloration with osmic acid, chloride of gold, and carmine often leaves one in the lurch, and one always judges best by the course of the fibres, and includes here chiefly the connective-tissue fibres which run transversely, traversing the several bundles of nerve-fibres till they reach the eye. By comparing these with many of my preparations of normal eyes, I could not suc-

ceed in the first two cases, which I regard as early stages, in establishing any increase of the connective-tissue. It was still more difficult to get a clear idea of the significance of the nuclei which were evident in all the preparations. Two circumstances must be particularly remembered in forming a judgment on this point. First, finely granular nuclei are often met with in considerable quantity just beneath the lamina cribrosa, quite normally, and may be traced from this into the highest region of the disc; and then too, through the swelling of the nerve-fibres, and the way in which sections are made, there occurs an optical delusion very often, simulating nuclei, so that one might very easily be led to adopt the opinion that there was an increase in the number of nuclei. Teased-out preparations afford the best means of judging of this, and by means of these it was not possible in the first two cases to demonstrate any particular increase of nuclei. These facts justify, in some degree, the opinion, that in the commencement of the process the share of the connective-tissue in the swelling is extremely small, and almost null, and that simultaneously with the swelling of the nerve there may perhaps be a very slight multiplication of nuclei. In the later stages, and perhaps even at the height of the swelling, the increase of nuclei and connective-tissue may take a more prominent part. The latter is particularly well developed around the central vessels. The more advanced the stage, the less nervous elements are discoverable, and therefore, at the same time, the more sunken is the optic disc. Partial or total atrophy thus represents the final stage of the whole process. In the latter, along with unusual increase of the connective-tissue around the vessels, remains of destroyed, swollen, and atrophic nerve-fibres, along with a great number of nuclei, are strewn all over the tissue; in the former there are the same elements, but mixed with a certain proportion of well-developed nerve-fibres.

As regards the behaviour of the vessels, an increase of

the smaller vessels may be safely affirmed in the earlier stages, both in the disc itself, and in its immediate vicinity. That this circumstance contributes towards the swelling of the disc, is manifest, and this will be still further the case, when the previously existing congestion has resulted in transudation into the disc, a possibility which cannot be disputed *à priori*, and for the existence of which many observers adduce evidence. I have not been unmindful of this so-called *œdematous* condition of the disc, but must confess that I have been unable to actually verify this in any of my preparations. Although it is doubtless an awkward task to diagnose an *œdematous* condition of such a tissue by microscopic examination, yet I was the less inclined to admit such a cause for the swelling of the discs, because I found what seemed an ample explanation in the swelling of the nerve-fibres, and the copious development of new vessels.

I do not mean to say that I deny the occurrence of such an exudation, since some of the cases seem to favour it, in which there has been found great swelling, with comparatively little degeneration of nerve-fibres, and an insufficient development of new vessels to serve as a sufficient cause for the prominence of the disc; only I want to explain, as far as I can here, that there is never any question of lymphatic exudation. I have in my collection preparations made from eyes, in which, as the result of a lesion in the neighbourhood of the disc, a swelling of the latter and of the retina also has occurred. A single glance at the microscope suffices to convince one how characteristic such lymphatic exudations appear. The whole region of the disc, down to the lamina cribrosa, and all the retinal layers, are crammed in such cases with finely granular, rounded cells (like pus-corpuscles).

Just in the same way as nerve-fibres, the vessels which traverse the disc and its surroundings, undergo for the most part during this retrogressive metamorphosis, the same predominant increase of connective-tissue.

Another remark must be added to the description of the above-named changes, although, indeed, it was not present in all, yet in four of the above cases it was so characteristic, that it must not be overlooked. This is, namely, the dilatation of the inter-vaginal space directly behind the globe. This is, as I was able to demonstrate in fresh preparations in Case III, filled with a turbid fluid, containing cellular elements. At the same time one finds the connective-tissue between the two sheaths thickened, and very often arranged in coarse bundles (Fig. IV). The structure of the optic nerve itself in four of the cases, so far as it could be examined, was perfectly normal; in the other three cases, along with complete atrophy of the discs, there was also atrophy of the optic nerves all through the portions which had been removed for examination. I will not now raise the question whether we have to do in these cases with a neuritis descendens or not; and this simply for the reason that up to this time I have never been able to examine an eye with its optic nerve, of which I could certainly predicate that the inflammatory process had gradually travelled along the optic nerve towards the disc, and so I cannot myself form any judgment on the matter; and, as regards the rest, I don't think that we need to embarrass ourselves in order to explain the atrophic processes; but that we may well admit that we have to do here with that kind of atrophy, which is wont to occur sooner or later with this sort of change [in the brain], and such as may occur, either wholly or partially, in other conditions of longer existence.

I have thus, as is evident from the foregoing, brought the changes which develop themselves in the discs, and their immediate neighbourhood, as a sequence to cerebral disease, into one point of view, because the anatomical changes may lead us to the discovery of the principal facts of these processes. If we make any division for practical purposes, it seems to be best to divide them into two groups:—

I. Those forms in which the development of new blood vessels, with perhaps the consequent transudation into the tissue of the disc, is the prominent feature.

II. Those forms in which the swelling of the nerve fibres (answering to fatty degeneration of these) occurs chiefly in the eye itself, and is the principal cause of the swelling of the discs.

The latter form, in which the changes of the nerve-fibres commonly extend themselves somewhat further into the retina, and in which it is not unusual to find extravasations of blood, and which indeed in some cases may simulate a retinitis morbus brightii [*sic*] is best distinguished by the name of *neuro-retinitis circumscripta*; the second form, on the other hand, which finds its type in the peculiar congestion of the disc, is best named *neuritis optica*. This distinction is by no means new, it has been in use a long while, and is principally borrowed from ophthalmoscopic researches. And although, indeed, very extreme cases may exhibit considerable anatomical distinctions, yet one can always demonstrate, in the cases of the second group, a fresh development of vessels in the discs, and in these the first changes in the nerve-fibres will be found. It is further satisfactorily determined, by ophthalmoscopic examination, that the first form not infrequently passes on into the second. Neither one form nor the other allows us to draw any safe conclusions as to the kind, or the seat of the central disease which exists.

Another very important question appears to me to arise, in the explanation of the connection between brain disease and the changes in question which affect the optic disc. I naturally consider here only those cases in which the communication (optic nerve) is not to be regarded as the originator, or principal agent (Fort-leiter in the morbid process).* Up to the date of this, three different expla-

* As mentioned before, I have, up to this time, never had an opportunity of examining an eye of which I could safely assert that the morbid process had crept from the brain along the optic nerve till it reached

nations of this have been given, of which the two first presuppose an increase of the intra-cranial pressure. They are as follows :—

1. Through the increased pressure within the cranium, pressure is brought to bear upon the cavernous sinus, which induces venous congestion in the central vessels of the optic nerve, which is also increased, as regards this, by the scleral ring (von Gräfe).

2. The intra-cranial pressure must force the fluid from the arachnoid space along the sheath of the optic nerve into the canal-like system present in the lamina cribrosa; and thus swelling, congestion, and the inflammatory symptoms dependent upon these, take their origin (Schmidt).

3. The third explanation, propounded by Benedict, asserts that the symptomatic neuro-retinitis (neuro-retinitis as a symptom of a vaso-motor disturbance) depends in the majority of cases upon a morbid innervation of the sympathetic, which is again itself a symptom of the most varied cerebral disorders (Processe).

Against the first theory, there are the following objections :—

1. The cavernous sinus is a blood-canal, surrounded with such impervious walls as are rarely to be met with, and a pressure sufficient to really compress this must, since the pressure within the cranium must be regarded as equal in all directions, exercise enormous pressure on all the other blood-vessels.

2. The vena ophthalmica superior, and vena ophthalmica inferior anastomose extensively both with one another, and also with the facial vein. And although the vena centralis retinae empties itself almost immediately

the disc. But the more I have employed myself in researches of this kind, the more doubtful do I become as to this mode of origination of the changes met with in the disc. However, as regards this, we shall derive the best assistance from those colleagues who specially interest themselves in diseases of the brain and nervous system, and have a large material to draw upon.

into the cavernous sinus, yet it previously anastomoses freely with the vena ophthalmica superior. But besides these anastomoses, it is quite indifferent whether the discharge takes place at the vena ophthalmica or into the cavernous sinus, since both are continuous, and the return of the blood suffers no hindrance so long as the way through the facial vein is patent (*Sesemann*).

3. Not every increase of cerebral pressure is followed by neuritis, and undoubtedly neuritis occurs where there is no such increased pressure.

4. Optic neuritis is sometimes one sided, and indeed has been often observed on the side opposite to the cerebral lesion, whilst the eye on the same side has remained perfectly normal (Case II).

The above-quoted 3rd and 4th facts may be adduced against the second theory. Yet apart from these, one would be inclined to accept the theory, as soon as one became convinced of the existence of such a system of canals in the lamina cribrosa as are presupposed. Hitherto I have not been so fortunate. The dilatation of the inter-vaginal space (between the outer and inner sheaths of the optic nerve) was indeed revealed in a very suggestive (*prägnante*) manner, yet it would not be difficult to explain this by a surmise that it had its origin in an inflammatory process previously existing in the disc.

Case V lends most countenance to this view, namely, in regard to the lacunous formation somewhat above the level of the choroid, yet since even here we have to do with a really atrophic process, this also is by no means conclusive.

The third explanation actually gains strength from the objections made against the two others, and Benedict especially calls attention to his successes with the constant current. From the point of view of pathological anatomy nothing special can be said either for or against it, since points of contact are wanting. However, in the majority of cases we shall do best to content ourselves with this,

if we must have an explanation at all, although it is partially inaccurate, and also requires further confirmation. In my view then, the affair stands thus:—The irritation conveyed through the nerve-tract of the sympathetic to the disc, induces the changes of the nerve-fibres, the hyperæmia, and even the development of new vessels, and in this manner, a swelling, and obfuscation (*Trübung*) of the disc, and the adjacent parts of the retina is brought about. The latter may then for its part have as a consequence an extreme degree of congestion of the venous system of the retina.

In any case it is very easy to bring the analytical facts in accordance with this explanation, and the very often asserted facts of the swelling of the optic disc of one eye only, is most easily explicable on this hypothesis.

Fig I



Fig. II

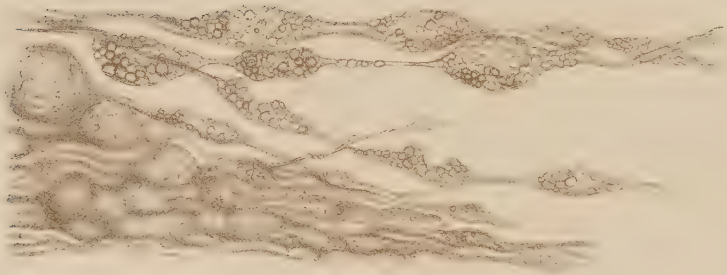


Fig IV

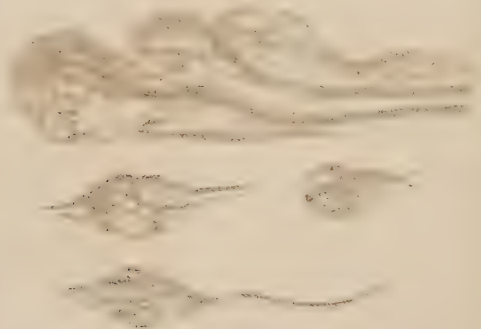


Fig III



Fig. V



Fig. VI

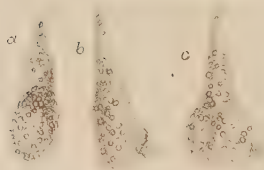
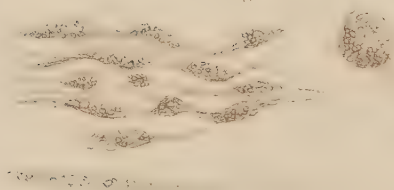


Fig. VIII

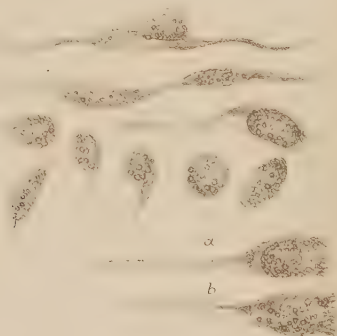


Fig. VII.

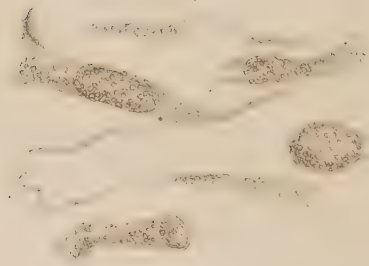


Fig. IX



Fig. X.

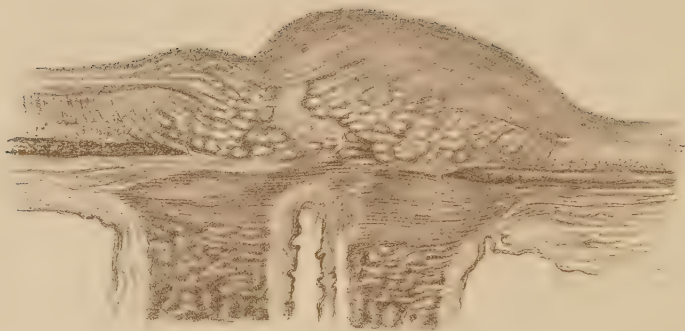


Fig. XI.

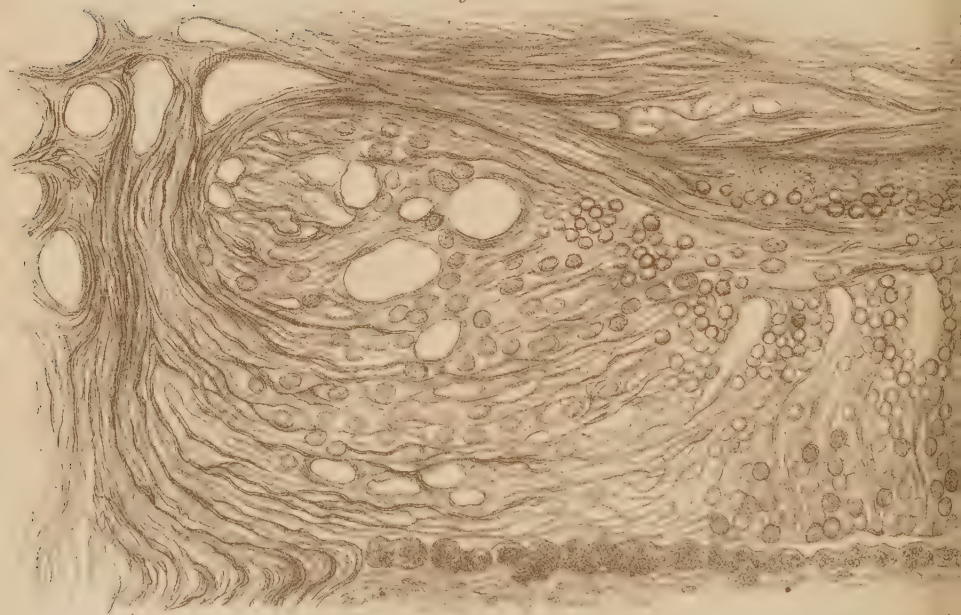
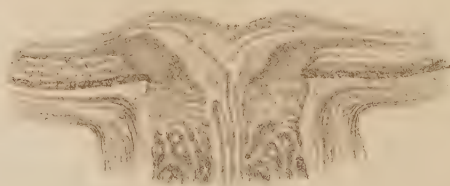


Fig. XII.



EXPLANATION OF THE FIGURES.

PLATE II.

- FIG. I.—Swollen disc (from Case I), 15 diameters; Swelling of the layer of nerve-fibres; Displacement of the remaining layers of the retina, with compression of the central vessels.
- FIG. II.—Spindle-shaped, and pearl-necklace-like swollen fibres from the free border of the swollen disc (from Case I), 550 diameters.
- FIG. III.—More uniformly swollen nerve-fibres (from Case I), 550 diameters.
- FIG. IV.—Club-shaped, swollen nerve-fibres from the white patches (plaques), seen by the ophthalmoscope (from Case I), 550 diameters.

PLATE III.

- FIG. V.—A section through the right (R) and left (L) optic nerve entrances, as well as a transverse section through the right optic nerve (s), where the sheath was most dilated (from Case II); natural size.
- FIG. VI.—Isolated swollen nerve-fibres (from Case II, right eye), *a*, *b*, *c*; The very same swollen nerve-fibre in different positions, explaining the nature of the apparent nuclei (550 diameters).
- FIG. VII.—Swollen nerve-fibres (from Case III), with apparent nuclei (550 diameters).
- FIG. VIII.—Similar figures as in Fig. VIII, with fine nuclei; *a* and *b*, the same fibre in different positions.
- FIG. IX.—Swollen, atrophic disc, with atrophy of the optic nerve, and marked dilatation of its outer sheath (Case V); section of natural size.

PLATE III BIS.

- FIG. X.—Section made through the disc (of Case V, right eye); Uneven, moderate swelling; Strong transverse markings of connective-tissue in the planes of the sclerotic and choroid; Representation of the areolar tissue at the level of the retina, and extending right into the layers of this (20 diameters).
- FIG. XI.—The progress of this areolar tissue towards the retinal layers (150 diameters); fibres springing from the areolar tissue extend into the outer granular layer, and displace the retinal layer somewhat outwards; (*a*) layer of atrophic nerve-fibres; (*b*) granular layer; (*c*) external granular layer; (*d*) internal granular layer; (*e*) pigmentary layer of the choroid. The ganglion-cell layer, the intervening granular layer, and the layer of rods and cones are deficient.
- FIG. XII.—Atrophic disc, succeeding a swollen one; Great development of connective-tissue, particularly in the region of the vessels (from Case VII). The displacement of the remaining layers of the retina, through the layer of nerve-fibres is also indicated.

LONG PERSISTENT DIPHThERITIC CONJUNCTIVITIS FOLLOW-
ING MEASLES.—LOSS OF BOTH EYES.—SCARLET FEVER
OCCURRING DURING THE COURSE OF DISEASE.

By FREDERICK MASON, Esq. (Bath.)

September 20th, 1870.—A healthy-looking, well grown child, aged eight months, was brought to me by his mother, who stated that in August the child had suffered from measles, from which he recovered; but shortly afterwards she noticed something within the eyelids, having the form of the lids and surrounding the eye. She got all away from the right, and this eye quickly recovered. She was unable to remove the whole of the false membrane from the left, and this continued to increase, and was accompanied by discharge.

At this time (Sept. 20th), the right appeared healthy, but the lids of the left were much swollen, with a thin discharge issuing from between. On separating the lids, a yellowish-grey membrane, about 2" thick, was seen surrounding the eye, and having the shape of the lids. The eye itself looked healthy. This membrane was easily torn off with the forceps, when there was free bleeding, which was checked by application of cold water. A solution of sulphate of copper was ordered to be dropped into the eye three or four times a day.

October 1st.—The eye in same state, the false membrane of same size, and as easily detached.

October 12th.—Membrane of same size. Swelling of lid less. On everting the upper lid, the growth was seen to be attached to conjunctival surface by a flat, broad base, and throwing off a free margin all round, like a lichen on an old tree.

The free margin was easily torn off, followed by bleeding, but no scraping or picking would remove the central attached portion; this was rubbed with nitrate of silver. The conjunctiva of lids was soft, swollen, and vascular. The upper incisors were just appearing, and the margin of the gums around the teeth was covered with a similar patch of whitish membrane. Borax to be applied to the gums, and the child to take chlorate of potash, with tincture of perchloride of iron.

21st October.—No improvement. I now applied nitric acid to inner surface of the lid.

27th.—Improved, but still growing. Again touched with nitric acid.

In consequence of the child having to be brought a distance of 20 miles, the attendance had hitherto been very irregular, and I did not see it again for 12 days.

November 8th.—Both eyes now diseased. The mother says that for three days after the 27th October she thought the child well, when he appeared to take cold, and both eyes became rapidly affected.

The lids of both greatly swollen, a thin, yellowish white discharge from both. The conjunctiva, covered with a broken, whitish, false membrane, which had now extended over the corneal surfaces, and both eyes destroyed. The eyes had a peculiar shrunken look. There was also a patch of greyish white membrane on the frænum beneath the tongue. Solution of nitrate of silver dropped into both eyes.

The mother now removed nearer Bath, and the child was seen more frequently, but up to the 18th there was no improvement.

November 23rd.—The child is now suffering from an attack of scarlet fever; the mother first observed the rash on the 21st. The eyes much the same; the membrane on the lids not so thick; the discharge thinner, but more abundant. There is also a profuse discharge, of the same yellow colour and consistence, from both nostrils.

25th.—Rash very pale. Discharge from nostrils less, whiter, and thinner.

28th.—Rash disappeared. Very slight discharge from nostrils. False membrane on eyelids less.

December 5th.—Eyes somewhat improved. Still some discharge from nostrils, and a similar discharge from both ears.

Since that time to the present (March 2nd, 1871) the child has improved in health. Discharge from nose and ears has ceased, but in spite of all the remedies employed (carbolic acid with glycerine, B.P. solution of hyposulphite of soda, nitrate of silver, zinc, alum, &c.), there is still the tendency to the formation of false membrane on the mucous surfaces of the lids, but which is more easily detached and wiped away than it was at first, and there is very slight discharge. The eyes are quite destroyed;

there is staphyloma of both corneæ, the surfaces of which are thickened and opaque. The child now keeps the eyes open.

The tarsal surface of the left is free from the false membrane, whilst the ocular surface is covered with it. The right the membrane covers the tarsal conjunctiva, and when removed it appears as if it took the place of a healthy and true epithelium.

In the case now brought forward it will be noticed that the child had measles in August, and it was after he had recovered that the mother noticed a growth within the eyelids. At the end of September, when I first saw the case, the eyes themselves were unaffected, and I was deceived by the appearance into the idea that in the left there was sloughing of the cellular tissue of the orbit around the eyes, and it was not until the third visit, when I was enabled to completely evert the upper lid that I discovered the mistake.

In October diphtheritic patches were observed on the gums and tongue, and at the end of November there was scarlet fever, attended with discharge from nostrils and ears, from which the child recovered without making any perceptible difference in the condition of the eyes.

As the title Diphtheritic Ophthalmia has been disputed by Dr. Mackenzie and others, I have been somewhat undecided what name to give to this disease; but by whatever name it may be called the disease remains the same, and fortunately it is a most rare one in England. If it had not been for the occurrence of diphtheritic patches on the gums and tongue, it would have resembled more nearly the description given by Bader ("The natural and morbid changes of the human eye") of "membranous ophthalmia," as distinct from "diphtheritic."

Soelberg Wells ("Diseases of the Eye") commences the chapter on diphtheritic ophthalmia with the following words:—

"This extremely dangerous disease is fortunately very rare in England. I have never yet met with a case of

pure diphtheritic conjunctivitis here, whereas during my residence in Berlin I had the opportunity of seeing many cases in Von Graefe's clinique."

Soelberg Wells describes the membranous form of ophthalmia as occasionally occurring in the course of severe purulent ophthalmia, and not as Bader does, as a distinct disease.

Mackenzie ("Diseases of the Eye") does not mention either form of disease.

The only cases I can find recorded as having occurred in England are—

At page 981, vol. for 1857, of the "British Medical Journal," is a paper (previously read at one of the meetings of this branch) by Mr. Pritchard on diphtheritic conjunctivitis, in which he says, "I have now seen 9 or 10 cases of acute conjunctival inflammation in young children, where, instead of the ordinary serum, mucus, or pus, fibrin has been effused, of the same physical characters as that effused in a recent case of acute pleurisy, which has adhered to the lids, and when unchecked by treatment has spread over the surface of the globe and destroyed the sight." Mr. Pritchard relates the history of one case occurring in connection with scarlet fever, other members of the same family of five suffering from diphtheritic affection of the throat.

In the second volume of the "Ophthalmic Hospital Reports," page 130, Mr. Hutchinson has published a detailed account of a case of diphtheritic ophthalmia occurring in conjunction with the poison of scarlet fever, and in his remarks says, "the case was one of a class entirely new to myself."

At page 363 of the fifth volume of the "Ophthalmic Hospital Reports" is a short abstract of a case which was treated in the St. Petersburg Eye Hospital, and which terminated in death on the tenth day.

In the "British Medical Journal," June 5th, 1858, is a report by Mr. Thompson, of Launceston, on diphtheria,

who out of 485 cases only saw the eye attacked in one instance.

Dr. Greenhow, in his work on diphtheria, referring to Mr. Hutchinson's case, says, "the rarity of diphtheritic ophthalmia may be inferred from the circumstance mentioned to me by Mr. Dixon, that out of the thousands of cases which annually come under the notice of the surgeons to the Royal Ophthalmic Hospital, this is the only genuine case of diphtheritic ophthalmia he had ever seen. This fact is the more remarkable, as it appears from the statements of French, and especially of German writers, that this particular form of disease is by no means uncommon abroad."

At page 175, second volume, "Ophthalmic Hospital Reports," are some remarks by Dr. Mackenzie on Mr. Hutchinson's case, in which he regrets that Mr. Hutchinson has used the name diphtheritic ophthalmia, as he considers the diphtheritic exudation to be only one of the symptoms of the ophthalmitis, which may be idiopathic, traumatic, and phlebotic, and may follow measles, small-pox, scarlatina, and typhus, being in these last instances in all likelihood pyæmic, or dependent on purulent infection of the blood."

Dr. Mackenzie also ("Medical Gazette," vol. xxxv, page, 594) says, "While he has observed as one of the consequences of ophthalmitis the production of false membranes on the conjunctiva, denies that there is any special form of ophthalmia which can with propriety be termed diphtheritic." In the cases related by Mr. Pritchard, he believes that the ophthalmia was the result of scarlatina poisoning.

STATISTICAL DETAILS OF FOUR YEARS' EXPERIENCE IN
RESPECT TO THE FORM OF AMAUROSIS SUPPOSED TO BE
DUE TO TOBACCO.

By JONATHAN HUTCHINSON, F.R.C.S.

IN the year 1864 I published, in the first volume of the "London Hospital Reports," under the title of "Clinical data respecting Cerebral Amaurosis," &c., a report on cases supposed to be connected with tobacco. I then gave all the cases of which I had notes which appeared to resemble the form due to smoking, including a considerable number in which it was quite certain that the habit referred to was not the cause. After this date, I carefully kept notes of every case bearing upon the subject which came under my notice, and, in 1867, the Medico-Chirurgical Society did me the honour to publish in their Transactions a statistical summary of my experience during the three intervening years. The cases included in that (second) report had been much more carefully selected, and from it several classes, which I had deemed it necessary to mention in my first, were wholly excluded. My recognition of the peculiarities of tobacco cases had also become somewhat more accurate. I now have to offer to the reader a third series of cases of the same kind, including most that came under notice during the four years, 1867, 8, 9, and 70. I regret that I cannot say that during this period I have kept notes of quite all that have been under my care, more especially during the year 1868; but those which have been omitted, have been left out simply from want of time to take notes, not from any principle of selection. Each of my three several reports presents a fair picture of my experience in respect to all cases which could be considered similar to those due to smoking. Each includes a few in which I think it very doubtful whether or not smoking was the real cause. I have been most anxious to give to the reader a fair oppor-

tunity of judging for himself as to the clinical features which this form of amaurosis presents in English practice, and of forming his own opinion as to whether the indictment against tobacco is a just one.

Any one who may take the trouble to compare the cases given in these three reports, will be struck by their similarity, and by the remarkable confirmation which the two later papers give to the conclusions of the first. A very great disproportion in the numbers of the two sexes who become the subjects of "idiopathic amaurosis," was one of the facts brought out (for the first time) by my first report. In it the numbers were 37 men and 3 women, and in the second they were 34 men and 5 women. In the present one they will be found to be 28 men and only one woman. There can, therefore, be no reasonable doubt that we have to deal with a formidable type of symmetrical amaurosis which is almost exclusively confined to the male sex. For myself, I may briefly avow that I have scrupulously investigated other possible causes, and that I feel no hesitation in believing that in most of these cases tobacco is the real one.

The facts as regards the one woman whose case is included in the present series, are extremely interesting. Her case in every feature resembled those which in males I attribute to smoking, and upon this point I had made special comment to those who were attending my class. After I had done so, she informed me that one of her sons had formerly been my patient, and that a nephew had been under the care of Mr. Hulke. I referred to my notes, and Mr. Hulke was kind enough also to refer to his, and we each found that the cases had been diagnosed as tobacco amaurosis. In each the patient was a young man and a smoker. Now the lesson of these facts seems to me to support the opinion I have long held, that when tobacco causes blindness it does so in virtue of an idiosyncrasy. It is by no means improbable that such idiosyncrasy will be found occasionally in several members of the same family,

and further that it may involve liability to suffer from other influences besides tobacco smoking. Thus, then, we have two young men, cousins, attacked by amaurosis at an early age in virtue of an idiosyncrasy rendering them liable to special poisoning from tobacco; and we have a woman, who had never smoked, the mother of one and aunt of the other, at a much later period of life becoming the subject of a similar form of nerve disorder in virtue of the same peculiarity of diathesis acted upon by a different exciting cause. In her not improbably the exciting cause was the disturbance consequent upon the cessation of menstruation.

Holding the opinion that there must be some pre-existing peculiarity in the nervous systems of those who become the subjects of tobacco amaurosis, I have been very anxious to discover if possible whether it reveals itself by any other signs. The only points in this direction to which I feel at present inclined to attach any importance are the following. Not unfrequently it will be found that these patients have had unusual difficulty in learning to smoke, and have throughout life displayed special susceptibility to its influence, and that also they have often been beyond the average liable to suffer from sea sickness. In the tabular statement some information will in many cases be found given on these points. My attention to the matter of sea sickness was first given in consequence of the statements of some patients who were sailors, and who specially referred to it.

We have, during the last few years, made the observation that those who suffer are, almost invariably, smokers of *shag*, the most deleterious form of tobacco. As regards the results from disuse of tobacco my impression is strong, that almost invariably when the disuse is real and complete, the state of vision improves. I cannot exaggerate the expression of my conviction as to the duty of urging immediate and complete abstinence in the early stages of this most serious malady. Many of my patients came too

late, having continued to smoke until the disease was far advanced. I have never seen a case in the early stage in which the disease went on to blindness if the patient had strength of will to give up the habit. In a large majority of those in whom, according to the patient's account, the habit was wholly abandoned, I had reason to suspect that it was only reduced. My experience on this point fully confirms that of Dr. Mackenzie, that there are those "who would rather smoke than see." It is very few, however, who have the honesty to admit their inability to give up the habit, and hence a very annoying source of fallacy in our inferences as to the effect of treatment.

It will be seen that in a few cases in the table, the amaurosis set in rather suddenly and advanced rapidly. This fact I always take as a strong one against the diagnosis of tobacco amaurosis, and in favour of that of neuritis. These cases ought, therefore, very probably to have been excluded from the list. As, however, the diagnosis is uncertain, I have preferred to let them stand. It so happens that some of these are the very ones in which no improvement resulted from the disuse of tobacco.

I have to thank my friends Mr. Waren Tay and Mr. Nettleship for much help in recording the notes of the cases and in compiling this report.

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
1. 1867, January 3. C. p. 94.	John Brewer, bricklayer. Has had good health.	22. 18 months.	Has smoked from a quarter to half an ounce of tobacco daily for five years and a half.	Left eye worse than right. Right sees 20 J. Pupils large, and the right one sluggish. Each disc pale, especially at its outer part.	Has been troubled with nocturnal emis- sions. Denies syphi- lis. Gradual failure of sight.	1867. March 7. Discs still paler, veins large, arteries small. Vision as before. He now says that he had not smoked for two years before the sight failed.
2. 1867, March 11. C. p. 157.	Samuel Park, shoemaker. Pale, and weak looking.	35. about 2½ to 3 years.	Has smoked for thir- teen years; at one time he smoked an ounce of tobacco daily; has left off smoking several times, and resumed it again. Has usu- ally been "worse for liquor" once every few months, but does not consider himself a great drinker.	Vision unequal in the two eyes; right, 1 J. and $\frac{2}{3}$; left, 16 J. and $\frac{2}{3}$. No material difference with glasses. Discs of a redder colour than natural, but otherwise normal. Pupils act well.	History of weakness of sight (probably failure of accommo- dation) in boyhood. Smoking makes him nervous if he ex- ceeds his usual amount. Sight has varied a good deal within the last two or three years, being, as he believes, worse when he leaves off smoking.	Has several times given up smoking for months together, because it made him nervous (made his hands shake, &c.), but has found that his sight always gets worse when he is not smoking. He is convinced that smoking is good for his sight; he gave it up only because it made him nervous.

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
3. 1868,	A woman.	43. 6 months.	Had never smoked. Strictly moderate in stimulants.	White atrophy in both.	None of any moment.	The symptoms had come on gradually, just as in the tobacco cases in men.
4. 1868, March 1. C. p. 259.	Moses Garcia, cab driver. Looks strong and healthy, though sal- low.	53. 9 months.	Has smoked from half an ounce to an ounce daily. Has drunk moderately.	White atrophy of both discs.	At the time when his sight began to fail, his general health was bad; he was nervous and weak, troubled with sleep- lessness, diminution of sexual appetite, and flatulence. Was obliged to give up his work, and was three months in the Jews' Hospital for dyspeptic symptoms. Has headache across the forehead. Has had gonorrhœa and chancres many times. No wasting of testes.	"The failure of sight coincided in time with general failure of health. He had indulged his sexual appetite very freely.

5. 1869, July 8. C. p. 318.	John Thompson, bailiff, in comfortable circumstances. Florid and robust. Hair, sandy-grey.	60. 9 months.	Has smoked forty years; for several years only a little; for five or six years past half an ounce a day. Has drunk alcoholic liquors constantly, but in moderate quantity.	Can see only 20 J. Discs white.	Has been very nervous for several years, especially after smoking in the morning. Many years ago suffered from "lumbago and sciatica," which laid him up for more than a year on and off. Gradual failure of sight.	1869, Sept. 2. Has not smoked at all since he came here. His sight has got worse; cannot now count fingers. Discs both equally and universally white; veins and arteries somewhat diminished.
6. 1869, Sept. 23. C. p. 324.	Wm. Billingham.	35. 6 weeks.	Has smoked at least half an ounce daily. Has drunk moderately.	Vision $\frac{2}{10}$, and 12 J. Discs pale at the outer halves; sheath at outer part very distinct, and a little disturbance of choroid. Inner margins indistinct, apparently from tendency to formation of crescents.	Has often noticed a nervousness from smoking. Gradual failure of sight.	Sept. 23. Can barely find the position of the window. Pupils contracted; they do not dilate in the dark, but dilate moderately with atropine.

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
7. 1869, July 12. C. p. 327.	John Smith, drayman. Dark com- plexion, and healthy.	45. 3 months.	Has smoked "as much as he could get," chiefly <i>shag</i> . Has drunk mode- rately.	Vision $\frac{2}{10}$ and 14 to 16 J. Discs de- cidedly whiter at outer than at inner halves; inner halves look slightly swollen.	Gradual failure.	1869, <i>Sept.</i> 2. Vision $\frac{2}{10}$ and 14 J. Con- siders his sight much better. Has left off smoking en- tirely. 1870, <i>June</i> 30. Vision $\frac{2}{10}$ and 8 J. <i>Oct.</i> 13. Just sees letters of 6 J. <i>Dec.</i> 15. Just sees letters of 4 J.
8. 1869, October 7. C. p. 337.	Thomas Wallis, has been a soldier.	42. 2 months.	Has smoked half an ounce daily for twenty years. Has not been in the habit of drinking while he smoked, and for two years has not drunk at all.	Vision $\frac{2}{10}$ and 16 J. Discs ill-margined, choroid thin, outer half of each disc decidedly pale; veins full, and arte- ries not dimi- nished.	Gradual failure.	1869, <i>Nov.</i> 4. Vision $\frac{2}{10}$ and 14 J.
9. 1869, October (about). C. p. 339.	James Morris, engineer (light out- door work); a Scotch- man. Health good.	40. 2 months.	Smokes an ounce daily of <i>pig-tail</i> tobacco. Drinks several glasses of brandy and some beer daily.	Commencing atrophy of discs.	Gradual failure. Is rather nervous; says he has noticed no ill-effects from smok- ing except occasional "heart-burn."	

10. 1869, July 5. C. p. 312.	Henry Cartwright, steward on board ship.	35. 2 months.	Has smoked half an ounce daily for twenty years. Has drunk a good deal.	Vision 19 J., and no letters in the distance. Discs decidedly paler at outer than inner halves.	Gradual failure; "is always in a fog." Has had no special inconvenience from smoking.	Is rather deaf; has been so for a year. 1870, <i>March</i> 15. Just the same. Dec. 15. Sees 10 J. Has not smoked at all.
11. 1870, Feb. 3. C. p. 366.	Samuel Barnard, stableman. Spare, and rather sallow.	61. 12 months.	Has smoked "moderately" forty years; generally <i>shag</i> tobacco. Has been steady, and has drunk chiefly beer.	Vision, right eye cannot quite tell letters of 20 J. Left eye sees 14 J. Discs, right uniformly white; left paler at its outer than at its inner half.	Gradual failure; the right eye began to fail before the left, and is in a more advanced state of atrophy.	
12. 1870, Jan. 10. C. p. 354.	R. J. Littleboy, sailor.	55. 2 months.	Has smoked half an ounce daily for thirty years, chiefly <i>shag</i> and <i>cavendish</i> tobacco. Has been a great drinker, half a pint of spirits, and two or three pints of beer daily, or more.	Vision $\frac{2}{3}$ J. Discs pale at the outer halves.	None mentioned.	Has never been sea-sick. No difficulty in learning to smoke. 1870, <i>March</i> 3. Vision $\frac{2}{3}$ J. and 6 J. (with + 20). Dec. 15. His wife reports that he can see to read the newspaper.
13. 1870, Feb. 21. C. p. 379.	George Jones.	30. 18 months.	Has smoked nearly half an ounce daily for six years of <i>shag</i> tobacco. Has drunk a good deal of gin and rum, but not generally when he smoked.	Vision, $\frac{2}{3}$ J. barely, and just sees 10 J. Discs, markedly pale at the outer halves; vessels not much diminished.	Gradual failure. Had no difficulty in learning to smoke; is not sick when he goes on the sea. Memory has failed of late.	

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
14. 1870, March 24. F. p. 4.	Thomas Allen.	53. 6 months.	Has used half an ounce daily, partly smoking, partly chewing, for more than thirty years, <i>shag</i> tobacco. Drinks porter, pretty freely at times; does not drink while smoking.	Vision, $\frac{2}{3}$ and 16 J.	Gradual failure; it began as a fog.	1870, April 11. Vision $\frac{2}{3}$ and 16 J.
15. 1870, April 11. F. p. 25.	Joseph Bryant, engineer. St r o n g; healthy man.	56. 4 months.	Has smoked for forty years; half an ounce daily for last five years, <i>shag</i> tobacco. Formerly drunk five or six pints of beer daily; for several years past has drunk only half a pint, and occasionally a little rum.	Vision, right eye $\frac{2}{3}$, and 20 J, increased to 10 J. with glasses. Left eye lost many years ago after an injury by a chip of iron. Disc in right, blue white.	Gradual failure; no pain.	Sight was excellent in right eye before the recent attack. 1870, Oct. 31. Says the sight is worse; sees $\frac{2}{3}$ and barely 10 J. with glasses. He wants to get compensation for an accident which has happened since he came before, and has, he says, made his sight worse.

16. 1870. May 5. F. p. 31.	Henry Lock, chairmaker. Pale, but in good health.	Not noted. 6 months.	Has smoked half an ounce daily for six- teen years <i>shag</i> tobacco. Has usu- ally taken two pints of beer daily; has never been intempe- rate.	Vision $\frac{2}{10}$, and 10 J. Discs seem slightly swollen and indis- tinct; the outer half of each is whiter than the inner half; this difference is less marked in the right.	Gradual failure. Is rather deaf, espe- cially on right side; has been so for several years.	1870, August 25. Vision 2 J.; has improved notably. Has not quite left off smoking. Has taken nothing but iron, and used a little astringent lotion for the eyes.
17. 1870, May 16. F. p. 34.	John Thorn- ton. Spare, healthy, and vigorous; face rather florid.	60. 7 weeks.	Has smoked (some- times chewed) half an ounce daily for twenty years <i>shag</i> tobacco. Drinks stout often when smoking, but con- siders himself tem- perate.	Vision $\frac{2}{10}$ and 14 to 16 J. Discs pale, especially at outer halves; arteries not diminished.	Says the sight failed rather suddenly, and did not get much worse afterwards. History of occasional dimness for several years, probably due to weakness of cili- ary muscle. Has been to sea a good deal, and is always sick for the first two or three days.	
18. 1870, May 19. F. p. 39.	Frederick Gra- ham, at pre- sent in a workhouse.	48. 5 weeks.	Has smoked half an ounce daily for twenty years of <i>shag</i> tobacco.	Vision 20 J.; nothing in the distance. Discs decidedly whiter at the outer than at the inner part.	He asserts that the dimness came on suddenly; as he was walking "a lot of gnats seemed to come before the sight;" he believes the sight has not got much worse since that time.	1870, June 23. Vision 16 J.; still nothing in the distance. Nov. 24. The same.

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
19. 1870. May 26. F. p. 39.	William Don- caster.	54. 12 months.	Has smoked about half an ounce daily for thirty-five years <i>shag</i> tobacco.	Vision $\frac{2}{30}$ and 16 J.; not improved by glasses. The ophthalmoscopic changes are not far advanced. The outer half of each disc is paler than the inner half; this is more marked in the right.	Gradual failure. He was very sick when he learnt to smoke; he has been to sea, and says that he has not been sea-sick.	1870, <i>Sept.</i> 1. Vision 10 J. Reads <i>Nov.</i> 7. Reads words of 4 J. with- out any glass. Still smokes a very little (half an ounce a month).
20. 1870, Oct. 3. F. p. 71.	Fredk. C. Hen- derson, mar- ried, a clerk. In good health.	30. 2 years.	Has smoked an ounce a week. Has never been intemperate.	Vision, with the left eye (the worse) he cannot see one's hand. Pupils of normal size, but act very sluggishly. Discs are grey-white, especially at their outer halves.	Gradual failure; sight has been as bad as now for ten months. If he smoked more than his usual quan- tity it made him ill.	He left off smoking a year before he ap- plied for advice. <i>Note</i> his inability to smoke more than a small quantity of tobacco.
21. 1870, July 7. F. p. 67.	Wm. Heatley.	50. 15--18 months.	Has smoked half an ounce daily for thirty years <i>caven- dish</i> tobacco.	Vision $\frac{2}{30}$ and 20 J. Discs somewhat pale, especially at the outer parts; left rather more so than right. There are slight iritic ad- hesions.	Gradual failure; no pain.	Had excellent sight formerly.

22. 1870. Oct. 17. F. p. 86.	John Liddle, joiner.	35. 7 months.	Has smoked two ounces weekly for sixteen years <i>shag</i> and <i>pig-tail</i> tobacco. Has drunk alco- holic liquors perhaps somewhat largely.	Vision, cannot count fingers at 3 feet. Dises atrophied; the left is more ad- vanced than the right.	He asserts that his sight failed rather quickly, in two or three weeks, but without pain. He never could smoke very easily, and was always faint and sick if he smoked more than usual.	Lives a long way off, and cannot come again.
23. 1870. Sept. 5. F. p. 89.	Wm. Owen.	63. 6 weeks.	Has smoked for more than twenty years <i>shag</i> tobacco; latterly has used a quarter to half an ounce daily.	Vision $\frac{20}{30}$, and 8 J.; not improved by glasses for distance. Dises decidedly paler at the outer than the inner halves; left worse.	Gradual failure; com- plaints of a fog.	For the last year has smoked more than he used to do; has had family troubles.
24. 1870. Nov. 14. F. p. 102.	Thos. Comery, bricklayer. In excellent health; dark hair and skin.	28. 3 months.	Has smoked more or less for twenty-three years, largely for a year and a half, now quarter of an ounce daily, <i>shag</i> tobacco. Drinks freely, and often gets drunk; drinks beer.	Vision 20 J.; cannot see 200 at 10 feet. Is hypermetropic. Dises very white, margins clear; arte- ries little, if at all, diminished.	He gets rather giddy at times, but is not otherwise ill.	Believes present fail- ure of sight began suddenly after expo- sure to the sun on a very hot day. Sight has continued to get worse ever since. Had great difficulty in learning to smoke when a boy.

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
25. 1870, Nov. 24. F. p. 105.	Charles Hopkins, engine-driver. Married; four children, all healthy. He is in good health, pale, dark hair.	35. 6 months.	Has smoked half an ounce daily for eighteen years <i>shag</i> tobacco. Drinks a very moderate amount of beer with his meals.	Vision $\frac{2}{60}$ and 8 J. Pupils act fairly well, and are of normal size. Discs decidedly pale at the outer halves; vessels not diminished.	Very gradual failure, has been nervous lately, but has not smoked more than usual. Had no special difficulty in learning to smoke; has never been to sea.	Had very sharp sight formerly
26. 1870, Nov. 28. F. p. 109.	Israel Meyers, packing case maker. Fairly healthy-looking; head bald. Has had "rheumatism" in hand and foot; was once laid up with it.	39. 2 years.	Has smoked for eighteen years; until a year ago he used half an ounce daily, since that time only half as much, <i>shag</i> tobacco. Has drunk beer and spirits moderately.	Vision, cannot count fingers; the left is a little worse than the right. Pupils of medium size, motionless. Discs very white, sclerotic sheath plainly seen; vessels not diminished.	Gradual failure; has had no pain or inflammation in the eyes. Of late, whenever he has smoked more than usual, it has made him nervous and shaky. Had considerable difficulty in learning to smoke.	

27. 1870. Nov. 28. F. p. 112.	Wm. Packer.	40. 2½ years.	Has smoked for twenty-four years; never smoked largely, from half to three-quarters of an ounce weekly, <i>shag</i> tobacco. Has drunk beer moderately.	Vision, can just tell light from darkness. Discs very white.	His sight began to fail in August, 1868; he believes that it began to fail suddenly on a hot day, and that it afterwards became worse. Learnt to smoke with difficulty, and has always been easily made sick and nervous by over-smoking. In boyhood he went to sea on board a collier, and was not troubled with sickness.	Has been under Mr. Couper's care for a long time; he continued to get worse after he left off smoking, and has been as bad as he is now for a year and a half.
28. 1870, June. F. p. 117.	J. Lack, married, farmer, labourer.	42. 18 months.	Has smoked for twenty-five years; sometimes as much as half an ounce daily, <i>shag</i> tobacco. Of late years has drunk a good deal of beer (two or three pints daily).	Vision about 16 J.; nothing in the distance. Myopic refraction. Discs in condition of white atrophy, especially at outer halves. There are also crescents, with ill-defined margins, probably advancing. Not improved for distance by concave glasses.	Sight has failed gradually. He says he could see well <i>in the distance</i> , as well as for reading, until about a year and a half ago. His sight (he says) varies a good deal, and is best in the dusk. Smoking has never disagreed with him.	It seems probable that the myopia and the atrophy of discs have to some extent advanced together. He has never used his eyes much at close work. 1870, Dec. 1. Sight no worse, perhaps a little better; 16 J. Has not smoked at all. Is better in health.

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
29. 1870, Dec. 5. F. p. 125.	Wasdall Mead- way, single. Has been farming, &c., at Cape and in Australia. In splendid health; light hair. Was once ill, more or less, two years ago with "liver com- plaint."	36. 6 months.	Began to smoke twenty-five years ago; has smoked quite regularly for eighteen years half an ounce daily; smoked a sort of roll tobacco ("Boor to- bacco") at the Cape. Drinks a fair quan- tity of beer, and some gin.	Vision $\frac{2}{3}$ and 12 J.; not improved by glasses. Discs de- cidedly paler at outer third; vessels of good size.	Gradual Learnt to smoke easily; it never dis- agrees with him, or makes him nervous. Is a good sailor.	

SUMMARY.—The five worst cases are, 20, 22, 24, 26, 27. In each the patient had been a *smoker for a long time* (average $19\frac{1}{4}$ years, excluding No. 20, in which this item is not given). In several of them (excepting 24 and 26) the *quantity of tobacco smoked had been comparatively small*. The quantity of tobacco used by the two patients whose sight was worst of all (Nos. 20 and 27) was less than that used by any other patient. The *duration of the amblyopia* in these severe cases was (with the exception of No. 24) considerable, the average (excluding No. 24) being $21\frac{1}{4}$ months. There were *other signs of intolerance of tobacco* in the same five cases. Only one other case (No. 6) is noted as having suffered any other unpleasant symptoms, and these were apparently slight. In all the worst cases the patients had used alcoholic drinks, and two of them had been great drinkers.

In the *worst case of all* (No. 27) the patient had smoked very little compared with most of the others; he had had difficulty in learning to smoke, and smoking had often in after-life made him sick and nervous. He had smoked for 24 years. According to his statement, his sight continued to get worse after he left off smoking, but as he did not come under my care until his amaurosis was almost absolute, I cannot verify his assertions on this point.

CASES SELECTED FROM OPHTHALMIC PRACTICE.

By CHRISTOPHER J. S. JEAFFRESON (of Newcastle-on-Tyne).

CASE I.—*Case of Congenital Malposition of the Lens in each Eye.*

J. F., æt. 18, applied to me on account of her eyesight. She is a dull, unintelligent girl, unable to read or write, and engaged as a general servant. She complained of confusion and indistinctness of sight, with occasional diplopia. These symptoms, she says, are aggravated in the dusk of the evening. She has never suffered from inflammation of the eyes, nor pain, and has never ailed in any way with the exception of her eyesight, which has been the same as long as she can recollect. At times she feels as though there were something alive and moving in the eye. On examination, the eyeballs were found to be somewhat smaller than usual, the anterior chambers shallow, pupils contracted but active, tension normal, $V = \frac{12}{cc}$ for distant objects; for near $\frac{1\frac{1}{2}}{XX}$,

but owing to her stupidity it was impossible to get a perfectly accurate statement of the acuteness of vision. A + 5, she says, much improves her sight, especially when placed in front of the right eye. On carefully examining the pupils, the right appeared dark and unobstructed, but towards the nasal margin of the left, although it was dark and transparent, there was a peculiar golden line of reflections, which immediately suggested a displacement of the lens. The pupils were now dilated at maximum, when, by aid of oblique illumination, the following condition was found:—Both lenses, though perfectly clear and transparent, were displaced towards the nasal side of the eye, that of the right was more displaced than the left; so internally was it situated, in fact, that it was completely covered when the pupil was contracted. Varying the position of the patient's head did not appear to move them, and, as far as I could ascertain, they were immovable. The result of an examination with the ophthalmoscope was very peculiar, for when the portions of the fundus, viewed through the lens, were clearly defined, the remaining portion of the fundus not being in the same focus,

appeared blurred and indistinct. The optic discs presented no symptoms of disease, and the rest of the deep structures of the eye appeared normal.

I thought it inadvisable to operate in this case, as the vision was sufficiently good for most of the purposes of the girl's life.

Wecker advises an irridodesis to be made in the direction that will bring the pupil opposite that portion of the fundus which is unobstructed by the lens, thus placing the case in the position of one which has had the lens extracted. As regards the right eye in my patient, the extract of calabar bean could always keep the pupil sufficiently contracted to cover the lens, and yet vision was by no means perfect with the use of a convex; and I argued from this that an operation would, in all probability, be unsuccessful in the other eye, and that a certain amount of amblyopia due to the reception from birth upon the retina of confused and imperfect images, would remain. The fact of vision being more indistinct in a subdued light explains itself without comment.

CASE II.—*Case of Erectile Tumour in the Orbit.*

C. M., æt. 14, a pale, delicate-looking lad, was brought to me on account of a protrusion of the ball of the left eye. The history his mother gave of the case was, that a very slight protrusion had existed at birth, and that with the growth of the child this had gradually increased.

The condition was as follows:—

The eye was displaced forwards and somewhat upwards to such an extent that the lids, which were rather cedematous, could not close over it. The tunics were much injected, the pupil sluggish, and vision reduced to the perception of large objects only. The movements of the eye were perfect, and there was no pain nor tenderness, but occasionally a slight aching and feeling of tension. The floor of the orbit seemed occupied by a swelling, which was deeply situated, had a hard and somewhat elastic feel, and, when pressure was made upon it, it yielded somewhat as though its calibre were diminished, or it slipped back into the orbit. At first I thought it was a deep-seated cyst, but a free puncture being made, no fluid escaped, and I came to the conclusion it was a solid growth. I recommended an operation, in

which the parents readily acquiesced. An incision was made in the conjunctiva below the globe of the eye and the whole length of the commissure; the tumour was readily reached. It was found to be large, extending deeply into the orbit, and surrounding the optic nerve.

I now found it necessary, to enable me to work with more facility, to enlarge the incision by dividing the external canthus, for the tumour was evidently of considerable size, and the hæmorrhage had become somewhat alarming. The growth had no connection with the bones, from which it was easily separated, and the whole mass, together with the eyeball, was rapidly enucleated. The socket was now firmly plugged with lint dipped in a solution of perchloride of iron. The boy though somewhat reduced by hæmorrhage at the time, afterwards made a rapid recovery.

The tumour was carefully examined by Dr. Philipson and myself.

It was firmish in texture, somewhat lobulated, and inclosed in an ill-defined capsule. Upon section, its structure appeared reticulated and spongy, and was found to consist of a large quantity of blood-vessels connected by condensed cellular tissue. In fact, there could be no doubt that the tumour was a vascular (erectile) one, which by its growth in a confined situation had been subjected to so much pressure as to result in its partial condensation.

CASE III.—*Absolute Amaurosis with Loss of Smell and Taste.*

E. G., æt. 38, a female who recently came under my notice, gave the following history of her complaint, which was verified by her former medical attendant. Two years ago, whilst in the enjoyment of perfect health, she began to feel a kind of uneasiness in the region of the frontal sinuses; by degrees a swelling developed there, and she became liable to epileptic fits, and gradually her power of smell left her. Towards the end of one year from the first appearance of the swelling, the epileptic seizures became very frequent, and during one of unusual severity a copious discharge of matter took place from the nostrils. On recovering from this attack, she found herself absolutely blind,

and unable to distinguish the taste of anything which was put into her mouth; but coincidently with this discharge, the fits left her, and have never reappeared since.

It is now twelve months since the blindness supervened, and the optic discs were found large, pale, and atrophied, and the retinal vessels much diminished in calibre. She is unable to distinguish the odour of any substance, but thinks the taste has slightly improved, as she can tell a strong acid when placed far back upon the tongue.

CASE IV.—*Double Glioma (?) of the Retinæ. No Operation.*

J. R., an infant, 12 months old, was brought to me for examination. He is a healthy looking child with fair hair; there is nystagmus and alternating strabismus. The pupils are midway between contraction and dilatation, and perfectly inactive. The anterior chamber is obliterated by the bulging forward of the lens, there is a faint sclerotic zone of redness, the tension of the eye is somewhat diminished, and the mother thinks the globes are not so large as formerly: from the fundus of each eye there is decided yellowish-white reflexion. I made repeated attempts to examine the eyes with the ophthalmoscope, but owing to the restlessness of the child and the fact that atropine exerted no influence upon the pupil, I was not able to succeed until chloroform had been administered.

Oblique examination showed the lenses to be clear and transparent, and with the ophthalmoscope a nearly white substance was seen projecting into the vitreous, which must have been in a great measure absorbed. The substance of the growth was smooth and almost of milky whiteness, and no traces of vessels were visible. The condition was almost identical in either eye, but in the right the tumour appeared to approach nearer to the lens.

The history of the case was as follows: A few months after birth the mother observed a cast in the right eye, but thinking it was nothing particular they took little notice of it. By degrees, however, they saw the child was less observant of things, and was constantly desirous of rubbing the eyes; nystagmus gradually supervened, and now the child seems totally blind, and

will lay for hours pressing his little hands against his eyes. The child's general health is good, and the mother does not think he suffers pain, although from his constantly rubbing and pressing the globes, there must be some feeling of uneasiness. The proposal I made to the mother that as a last resource both globes should be enucleated was rejected.

CASE V.—*Foreign Body Lodged in the Orbit.*

E. D., a lad of 13, presented himself with a small cystic tumour at the corner and inner margin of the orbit, the skin over it was smooth and of natural appearance, but the tumour was so closely adherent, that it seemed impossible to remove it without sacrificing some portion of integument. The boy says that some months ago whilst running, he struck his head against a tree, and that soon after the tumour began to develop without pain or inflammation. It is now about the size of a large filbert. I made an incision into the cyst, and turned out its contents, which proved to be thick curdy pus. This led to the idea that a foreign body might be lodged in the orbit; search was made, but none could be found; a lint was introduced to induce the cyst to granulate from the bottom. About ten days after, my partner, Mr. Fife, observing something black projecting in the wound, removed it, and found it to be a splinter of wood almost an inch in length and the thickness of a small pen-holder. The boy did well.

CASE VI.—*Curious Case of Traumatic Cataract.*

A lady brought her son, *æt.* 8, to me with a well-marked cataract of the right eye. The lens was perfectly opaque and somewhat swollen, and had very much the appearance of a congenital cataract. The history given of the case was that four months ago the boy had a slight inflammation of the eye which lasted a few days, and shortly after that the cataract began to form. I dilated the pupil and proceeded to examine the lens carefully with oblique illumination, when I found a dark black looking line occupying the lower and inner part of the periphery of the lens. This was soon discovered to be a portion of a needle,

and after diligent search the small scar was found where it had penetrated the cornea. The child, who seemed to have a wholesome dread of punishment, denied all knowledge of the affair. I purpose in a few days removing the lens and foreign body.

CASE VII.—*Foreign Body in the Eye.*

A child was struck in the eye with the lash of a whip; sight was almost immediately lost, but very little inflammation followed. Six months after I saw the child, the globe was slightly shrunken, the pupil active, the lens somewhat opaque. On dilating the pupil, a dark line was seen descending vertically across the back of the lens, dividing the field into two equal lateral portions. On everting the upper lid and directing the girl to look as much downwards as possible, I found a small piece of something still projecting through the sclerotic. I seized it, and withdrew from the globe a piece of stout copper wire fully an inch in length. It was afterwards discovered that the lash of the whip with which she was struck had upon its end a piece of wire. Loss of sight was complete.

CASE VIII.—*Detachment and Extrusion of the Lens and Iris following a Rupture of the Eyeball. Good Vision remaining.*

H. W., æt. 45, struck his eye against the sharp corner of a table; the blow was productive of great pain, and shortly after he presented himself to me. The whole of the anterior chamber was filled with blood, and a small rent was found in the sclerotic at the lower and inner corner close to its junction with the cornea. Nothing protruded from the lips of the wound, and the globe was not much shrunken. It was impossible from the effusion of blood to come to any conclusion as to the amount of mischief done.

This patient was lost sight of for four months, when I again saw him and exhibited the case at the Northumberland and Durham Medical Society. The cornea was perfectly clear. The iris entirely absent, and not a trace of the lens remaining. Oblique illumination shows a small white speck about the size of a pin's head upon the anterior surface of the hyaloid membrane.

With the ophthalmoscope the vitreous was found perfectly clear and transparent; there was highly marked hypermetropic refraction, such as we see after cases of cataract extraction; the fundus appeared healthy. V with $a + 5 = \frac{20}{XL}$ for distance. For near objects, $V = \frac{2}{5\frac{1}{2}}$ with $+ 2\frac{1}{2}$.

Another curious point in connection with this man, though not bearing upon his present symptoms, was that some fifteen years ago he was trephined for epilepsy (as far as I can make out) by the late Sir John Fife, and apparently with success. The circular aperture is distinctly felt in the centre of the left parietal bone.

CURATOR'S PATHOLOGICAL REPORT.

By EDWARD NETTLESHIP, F.R.C.S., Curator to the Hospital.

IN the following account, the arrangement originally adopted by Mr. Bader for the specimens in the Ophthalmic Hospital Museum has been followed. Eyes marked * have been preserved in the Museum; those to which a † is affixed were not obtained from patients of the Hospital. The account includes most of the eyes removed between May 1st and July 1st, 1871.

EYES LOST BY INJURY.

† 1. *Wound in Ciliary Region—Foreign body embedded in Eye—Excision on fifth day—Purulent Iritis—Cell Proliferation of Cornea—Recent inflammatory changes in Superficial Layer, and to a less extent in deep layer of Choroidal Stroma—Disorganization of Retina—Suppuration of Hyaloid—Lens healthy.*

Mr. A., æt. about 40, patient of Mr. Hutchinson's. Five days before excision his right eye was wounded by a chip of metal; an unsuccessful attempt was made by a surgeon the same evening to remove the chip. The eye had on several previous occasions been inflamed and painful, and a surgeon had suspected the presence of a foreign body some time before. There was a wound in the ciliary region, involving also the margin of the cornea, with prolapse of iris, but no foreign body could be found by Mr. Hutchinson when he saw the patient the day after the accident. The cornea and iris inflamed, the latter producing pus in abundance. On cutting open the globe, a chip of iron $\frac{1}{8}$ in. long, thin, sharp, and quite clean, was found imbedded in the sclerotic, close to the corneal attachment; it corresponded in position with the wound, but was hidden. It was quite loose. Some of the structures were examined after hardening for a few days in chromic acid. The iris was covered by pus, and swollen; it was not examined microscopically. Cornea considerably thickened; no anterior epithelium seen in vertical sections; corneal corpuscles enormously enlarged by proliferation of nuclei, each

nucleus seeming to have produced from about half a dozen to upwards of fifty new inflammatory corpuscles. Posterior elastic lamina normal. Posterior epithelium not seen, but its place occupied by a layer of dark, finely granular and fibrous material, of somewhat greater thickness than the elastic lamina; this was probably fibrinous exudation from the iris or cornea. Lens, transparent. Choroid, its epithelium almost entirely absent; elastic lamina normal. Superficial layer of stroma (choriocapillaris) much thickened, highly granular, and infiltrated with ill-defined recent inflammation corpuscles. Deeper, pigmented, layer of stroma showed the pigment cells to be normal, but there was considerable corpuscular and granular infiltration; the structures of this layer were also remarkably and irregularly opened out, or separated from one another, so as to present, in vertical sections, numerous large circular spaces of various sizes, bounded by the stellate pigment cells and inflammatory products. These spaces were probably filled with fluid, the result of inflammatory oedema. Retina, detached everywhere except at the ora serrata and optic disc, the attachment to the latter being only very slight. Retina and hyaloid together formed a thick oedematous, soft, semi-opaque membrane, in which none of the retinal elements were with certainty recognised. The hyaloid membrane was suppurating freely, being covered with numerous pus corpuscles, which, even where most sparingly present, gave it the appearance of a very thickly nucleated young tissue. There were some brood capsules. None of the new cells had begun to develope into connective-tissue forms.

† 2. *Blow on the Eye—Suppurative Cellulitis of Orbit—Hypopyon—Excision on seventh day—Recent Optic Neuritis and Oedema of Retina.*

William Felton, æt. about 35, received two severe blows on the left eye and neighbouring parts, at an interval of about four days. The second blow was followed rapidly by great swelling, and in a few days by diffuse suppurative cellulitis of the eyelids and orbit, in appearance just like erysipelas. He had not been exposed to contagion of erysipelas, and it was stated that the blows did not produce any wound. Free incisions into the lids

were not followed, after several days, by any diminution in the severity of the symptoms; these were exophthalmos, hypopyon, all but total blindness, considerable constitutional disturbance, and for the first few days great pain. Excision performed on the seventh day after second accident. Cornea partly opaque; large hypopyon. Iris not examined. Lens and vitreous looked healthy. Optic disc swollen, white and "woolly," the vessels being partly buried: retina everywhere spotted over with small patches of whitish semi-opaque appearance, as if œdematous, this change being especially marked near the y. s.

The disc and neighbouring retina were carefully examined. The large blood-vessels remained distended with blood after hardening in chromic acid solution. Numerous white blood corpuscles adhered to the inner coat of the vessels, and just where the vessels began to dip into the physiological cup large lymph-like corpuscles were observed immediately outside their walls. These corpuscles were for the most part larger than the white blood cells from which they were separated by the walls of the vessels, some of them much larger. They were generally oval, and each contained a single round or roundly oval nucleus about as large as a red blood corpuscle. In the nerve-fibre layer near to the disc there were also changes probably indicative of infiltration with albuminous fluid. The nerve-fibres were slightly granular and less regular in outline than those of a similarly prepared healthy eye. In thick sections there were appearances resembling oval, thin-walled cells distributed among the nerve-fibres, but in teased-out specimens these were seen to be really oval spaces between the nerve-fibres. They were not cells, for they could never be isolated from the nerve-fibres; neither were they swellings on the nerve-fibres, for they were never seen associated with only one fibre, but always between two or more. They were considerably larger than the ordinary varicose swellings of the nerve-fibres; their outlines were thin and highly refracting and their interior clear. Such appearances might probably be produced by effusion of albuminous fluid between the nerve-fibres, and subsequent coagulation of its solid part around small drops or globules of the watery portion. It is very likely that the preservative fluid had something to do with the production of these cell-like appearances.

Sections of the choroid showed its larger vessels distended

with blood, but no other changes were noticed. I did not make a prolonged examination of this coat.

3. *Blow on the Eye—Hæmorrhage between Sclerotic and Choroid—Suppuration of Choroid and probably of Retina and Vitreous—Sloughing and Perforation of Cornea—Blood-clot beginning to suppurate—Excision three weeks after accident.*

Eliza Nightingale, æt. 50, under Mr. Couper's care. Her right eye was struck by a hammer one week before admission. The eye was said to have been quite blind immediately after the accident. Latterly it had been very painful. She refused excision at first, and the eye was not removed until three weeks after the accident. At the date of operation there was much inflammatory œdema of the lids and conjunctiva; the cornea had in great part sloughed, the remainder being opaque and yellowish; the eye burst during enucleation. It was opened the next day (not having been put into any solution) by an antero-posterior section. The lens was absent. Neither retina nor vitreous could be detected, the place of these parts being occupied by yellowish semi-fluid, somewhat flabby puro-lymph. The choroid was separated from the sclerotic, in some parts widely, by a soft red succulent fibrous-looking substance. This succulent fibrous-looking material also infiltrated the substance of the choroid itself so that it was not always possible to be certain where the choroidal outline ran. The ciliary processes were separated from the sclerotic by similar material, but their characteristic black outline remained sharply defined. The new material consisted of—1st, a close arrangement of fine fibres quite distinct from each other, running for the most part in straight lines, and forming irregular bundles, which crossed each other at various angles; 2nd, crowds of lymph-like corpuscles of various sizes. Precisely similar elements were found mingled with the choroidal stroma in the ciliary region. In some places there were masses of purely corpuscular structure indistinguishable from pus. Some altered blood pigment masses were seen in parts.

- *4. *Rupture of Eye, two Months—Displacement of Lens into Vitreous Space—Detachment of Retina—Bleeding between each of the Coats and at normal position of Lens, &c.—Commencing Colloid Degeneration of Choroid with Atrophy of its Stroma.*

Peter McK., æt. 46, came under the care of Mr. Wordsworth on account of his right eye. It had been intentionally "gouged" by another man with his thumb or a stick eight weeks before. Sight was immediately lost, and the eye had been painful ever since the accident. The eye was found on inspection to be somewhat smaller than the other, with T —, much congestion and great pain. The cornea was slightly hazy and the iris in contact with it. He had bare perception of light with the eye. Excised on the day of admission. Hardened in chromic acid for a week. Globe much puckered, the chief indentation forming a somewhat deep groove running round the eye at the equator; several less marked contractions ran into this one from the front. Just behind the internal rectus was a deeper pucker, to which the external tissues were very firmly adherent. A horizontal antero-posterior section was made passing across the last-mentioned part, and showing that it was the scar of a wound of the sclerotic; the wound had probably been half an inch long. The edges of the ruptured sclerotic were turned inwards and away from one another, and were distinctly thickened and club-shaped. The sclerotic around the optic nerve entrance was much thickened. The wound was filled with a small plug of tough brownish substance. Similar material filled the whole ciliary region and the position of the lens; the edges of this mass were thicker than its centre, so that it formed a biconcave disc in the place of the lens and ciliary processes. The iris was slightly curved backwards. This substance was in parts spongy and porous. It consisted of a fibrinous basis, containing sparsely scattered lymph-like corpuscles and many spherical yellow-brown pigmented masses of various sizes. There were no signs of either fatty degeneration or transformation into fibrous tissue.

Retina detached, except at the optic disc; the space between retina and sclerotic on the inner side (towards the wound), filled with firm fibrous-looking material, something like that in the front of the eye, with which it was continuous at the position of the wound. The outer part of the space between retina and

choroid filled by bloody fluid and partly decolorised clot. Vitreous space contained blood partly decolorised, and lying at its lower part was the transparent lens in its capsule, its posterior surface looking upwards.

The choroid was not distinguishable on the inner (wounded) side; at the outer side it was *in situ*, and looked healthy to the naked eye. On minute examination it showed, however, irregular distribution of the epithelial cells with alterations of their form; small, highly refracting, sharp outlined hemispherical projections from the elastic lamina, and an abnormally fibrous appearance with deficiency of cells in the chorio-capillaris.

The optic nerve was much wasted, especially at the scleral ring, where it appeared constricted by the thickened sclerotic. The cornea was blood-stained; anterior chamber, deep, but of good form.

*5. *Punctured wound of Eye—Detachment of Retina—Hæmorrhage between Choroid and Retina, and into Anterior Chamber—No Lens—Excision 3 Months after wound.*

Winnifred Sawyer, æt. 10, Mr. Hutchinson's patient. Her right eye was punctured by scissors 3 months before admission. When she applied the lost eye was very painful and tender, cornea hazy and prominent, anterior chamber full of blood. The other eye was irritable. Excision was performed 4 days after admission. The globe was found to be considerably shrunk and misshapen, the cornea being excessively prominent, while the vitreous chamber was flattened from before backwards. After a month's hardening in strong spirit, an antero-posterior section was made. The eye had shrunk slightly more while in the spirit. A very marked puckering and indentation was noticed at the front part of the sclerotic, and probably marked the seat of the wound. No trace of lens was found. The situation of the posterior capsule was marked by a small patch of very firm white tissue. The iris was not identified, but was probably represented by a thin dark line at the back of the cornea. The anterior chamber and position of lens were entirely occupied by a firm dark-red uniform clot of blood. The retina was detached (except at the disc), and as far as the equator; it was shrunken, opaque, and yellow, and formed a conical mass of soft, solid

tissue, containing no vitreous space. In structure it consisted of a whitish soft substance, having a slightly fibrous appearance, and easily splitting or tearing; it was composed of overgrown retinal fibrous tissue, together with very beautiful long nucleated spindle-cells, mixed with large numbers of round lymph-like cells, probably derived from the granular layers; there were no signs of fatty degeneration. The space between retina and choroid was large, and filled by flocculent greyish and yellowish material, in parts blood-stained, but nowhere simple blood-clot. It consisted of granular matter, with numerous large compound granule cells. It was probably partly decolorized and degenerated blood-clot. It adhered slightly to the choroid in many places. The optic nerve at its entrance was small. The choroid looked too thick, but this was probably from shrinking; its epithelium looked normal, and with a hand lens no trace of colloid degeneration could be seen. The choroid was drawn forwards at the optic disc by the displaced retina, and at the equator it, as well as the sclerotic, was drawn inwards towards the hyaloid fossa.

**6. Blow on the Eye, 16 Years—Quite Blind, 11 Years—Frequent Attacks of Pain—Blow near the Eye, 1 Month—Eye Shrunk—Absorption of Lens—Detachment of Retina—Atrophy of Choroidal Stroma, with Inflammatory Changes and Colloid Disease—Vessels in deep layers of Cornea.*

Fredk. W. M., æt. 50, Mr. Critchett's patient. His left eye was struck by a round piece of wood 16 years before excision; sight was immediately much impaired, but was not totally lost for about 5 years; the eye had been quite blind for about 11 years. He had had several attacks of pain since the accident, and the lost eye had almost constantly been "blood-shot." For 2 or 3 months previous to excision the eye had given him a good deal of pain, and this had become worse after a blow on the left eyebrow (? on the blind eye) 1 month before. Before excision the eye was very soft, appeared smaller than the other, and was quite blind. It was much congested, and the cornea was also very vascular and uniformly semi-opaque. The right eye was irritable, but not inflamed, and its vision good.

After removal the sclerotic was somewhat shrunk, and squared,

and there was a shallow groove running round the eye at the equator. The optic nerve was wasted and pinkish. After soaking for 4 days in glycerine and diluted spirit, it was divided vertically in the antero-posterior direction into unequal halves. The cornea contained many small blood-vessels. None of them were on or near to the anterior surface; the largest (the trunks) were at or perhaps rather in front of the middle layers, while the smaller and much more numerous ones (branches) occupied the deepest corneal strata, some being close to the posterior elastic lamina. The anterior epithelium and both elastic laminae were normal. There was no obvious proliferation of the corneal corpuscles anywhere.

The sclerotic was irregularly thickened. The lens was absent, its capsule being thickened and opaque, and the anterior and posterior layers in apposition, but not adherent to each other. The retina was detached in the form of a hollow cone, with its apex at the disc, and its base at the ora serrata; it was shrunken, semi-opaque, and enclosed only a very small vitreous space, the fluid of which was not separately examined. The retina consisted of its connective-tissue and granular elements only; some of its fibres were fatty; it contained many blood-vessels. The large sub-retinal space was filled with thick chocolate-brown fluid, containing many darker reddish flocculi, which sank to the lowest part. The fluid and flocculi consisted of fine molecules, oil-globules, large spherical coarsely-granular cells of yellowish-brown colour, and pigmented granule masses. The choroid was in contact with sclerotic everywhere, and not thickened. Its epithelium was disturbed so as to form innumerable small islands, consisting of pigmented globular or oval masses as large as several cells put together, and frequently showing a clear space in the centre like a large nucleus. The elastic lamina was normal in most parts, but occasionally showed enlargements which disturbed its normal outline (commencing colloid bodies). The stroma in most parts contained no stellate pigment. It was composed chiefly of fibrous-looking tissue which had undergone considerable fatty change, and numerous round corpuscles as large as white blood-cells, and most numerous in the chorio-capillaris; some of these were in all probability blood-corpuscles, but the great majority were too evenly distributed and too far apart to admit of this explanation. There was no bone. The

iris was thin, shreddy, devoid of pigment, and adherent to the anterior lens-capsule.

7. *Eye wounded, 11 Years — Much Shrunk — Lens Chalky — Ossification of Choroid—Detachment and Fibrous Degeneration of Retina.*

Thomas Falahee, æt. 18, a patient of Mr. Critchett. His left eye had been lost 11 years before excision, by a wound with a fork. It had not lately given him any trouble, but he fancied it might injure the sound eye. The lost eye was very small and felt hard; the cornea was opaque and showed a linear scar. When examined the sclerotic was found much puckered and thickened. The choroid was extensively ossified on its inner surface, the bone forming an irregular plate passing from close to the optic nerve entrance forwards to the ciliary region; a band, including somewhat more than a third of the whole choroid, was thus affected. The bone was thickest near the optic disc, and from the thickest part spiculæ projected into the yet unossified parts; it did not surround the optic nerve completely. The lens was represented by its nucleus, which was of normal shape, yellow colour, and stony hardness; fragments showed no definite structure; they effervesced strongly with nitric acid. The retina consisted of a buff-white soft fibrous mass, showing no membranous arrangement, and enclosing no cavity; it consisted wholly of definite rather fine fibres, and very long fibre-cells, containing oval nuclei, or oval central bulgings; there were numerous small blood-vessels, most of which were in an extreme state of fatty degeneration; there was a moderate amount of free granular matter, but no round cells. The ciliary processes and iris were represented by tough, black tissue, adherent to the nucleus of the lens.

8. *Eye lost many years—Shrunk—Plate of bone in Choroid around Optic Disc—Colloid disease of Choroid—Detachment of Retina with calcification of its vessels—Old Cyclitis—No Lens—Sympathetic Ophthalmitis of other Eye.*

Anne Warr, under Mr. Critchett's care. Her left eye was lost many years before excision, but the nature of the

accident was not ascertained; recently the right had become sympathetically inflamed. The left eye at the time of excision was much shrunken and puckered, one groove especially marked ran transversely across the front of the eye. Remains of cornea clear. It was dissected the same day. There was no trace of a lens. The choroid at the back of the eye contained a large thin plate of bone which surrounded the optic nerve completely. The rest of the choroid was thickly dotted with "colloid" bodies which were visible to the naked eye, and looked like grains of fine sand; under the microscope they were seen to be still covered more or less by mis-shapen epithelial cells. The retina was partly detached, remaining attached at the optic disc; it had undergone extensive fatty changes, and some of its larger vessels showed much calcareous degeneration, and effervesced with nitric acid. The vitreous was quite fluid, and contained much cholesteroline. There was a good deal of opaque white deposit at the back of the ciliary processes.

9. *Eye lost by (?) wound, 7 Years—Shrinking and Fibrous Degeneration of Choroid—No Bone.*

John Anderson, 65, a patient of Mr. Lawson's, was admitted on April 18, 1871, on account of a sloughing ulcer with hypopyon of his left cornea, from an abrasion. The right eye had been lost seven years before by an accident, probably from the history, a wound by a stone. The lost eye was much shrunken, and the cornea was barely distinguishable. In June it became painful, and was excised. When opened, the choroid was found to be separated from the sclerotic. Neither retina nor lens could be detected, the space inside the choroid being filled by very firm (occasionally gritty) white fibrous scar-like tissue. There was no bone.

10. *Blow on a previously Blind Eye—Rupture of Sclerotic and escape of Lens beneath Conjunctiva—Little pain—Excision on the 6th day.*

Mary A. Webb, 47, patient of Mr. Streatfeild. She applied on account of a recent accident to the left eye. The same eye had been blind for 12 years from iritis. Five days before excision

she struck the eye against the projecting inverted leg of a table; the accident had not been followed by much pain. Before excision the cornea was clear. Pupil blocked by old lymph, and presenting some recent reddish specks; pupil displaced upwards somewhat as after a free iridectomy, but ciliary margin of iris invisible at upper part by reason of overlapping œdematous conjunctiva. A large oval swelling beneath conjunctiva at upper part, of purplish colour, and not tender. During excision the transparent lens escaped from beneath the prominence mentioned, and the globe collapsed. A large rent was found close to sclero-corneal junction. Retina torn away from the optic disc and detached almost everywhere. Choroid near to optic disc rent in several places, quite movable and not at all adherent to sclerotic at the torn parts; the torn edges had retracted, and left a considerable patch of sclerotic bare; choroid looked normal to the naked eye.

11. *Eye injured (? wounded) by a Gun-explosion, 4 Years—Eye shrunk.*

J. Alcock, 26, under the care of Mr. Couper. Four years before excision his left eye was "blown out" by a gun-explosion; a piece of gun-barrel as large as the nib of a pen was stated to have gone into the "corner of the socket," and to have "turned the eye out." He had no sight with the eye after the injury. Excised on May 26, 1871. Left globe very much shrunken and puckered; no cornea. On section, only sclerotic and choroid recognised. No bone. Sclerotic much thickened. Optic nerve shrunken so as to leave a large space between itself and its sheath. No foreign body found.

12. *Hæmorrhage between Sclerotic and Choroid, and probably into Anterior Chamber—Shrinking of Eye—Probably lost by a Wound.*

An eye removed by Mr. Bowman. Much shrunken. Cornea small and partly opaque. The choroid was found detached, and forming a hollow cone which contained the retina. Choroid degenerated on its inner surface into white, firm, tough fibrous tissue containing many fine granules. No lens. Much soft fibrous-looking structure in position of lens, and adhering to

posterior surface of cornea (not microscopically examined). Between choroid and sclerotic brown thickish opaque fluid containing a large quantity of cholesterine.

EYES LOST BY SYPHILIS.

13. *Interstitial Keratitis—Peripheral Choroiditis—Glaucoma—Inflammatory Sub-retinal Effusion—Equatorial and Ciliary Staphyloma not involving the inner layers of the Retina—Iridectomy (date unknown)—Lens shrivelled—Other signs of Inherited Syphilis.*

Benjamin S., æt. about 35, Mr. Streatfeild's patient. His eyes had been first inflamed at the age of 5 years. At the date of admission his right eye had for 10 years been as defective in regard to sight as it then was; latterly it had been inflamed and painful. The condition of the right (excised) eye was as follows. The cornea was opaque all over, the opacity being specially dense and yellowish-white near the centre. The pupil was quite occluded, and the iris almost in contact with the cornea. There was a commencing scleral staphyloma, forming an antero-posterior band about $\frac{1}{2}$ inch wide at and in front of the equatorial region; it did not bulge much, but the coats appeared by transmitted light to be considerably thinned. In the left eye (examined after excision of the right) the cornea was nebulous, probably from past interstitial keratitis. The patient's central upper incisors were notched in a manner quite characteristic of inherited syphilis.

The globe was hardened in chromic acid and divided into an anterior and posterior half. The sclerotic looked normal, except at the staphyloma, where it was much thinned. The choroid was everywhere in apposition with the sclerotic. It was examined minutely only at and near the staphyloma. The epithelium was disturbed, its cells irregular in shape and size, and the pigment granules irregularly distributed. Its stroma was thickly strewn with fine granules. At the staphyloma it was thinned out, and its stellate pigment cells atrophied.

Between choroid and retina was a thin, irregularly distributed layer, deficient in many places, of granular whitish material, containing small, free, oval, and round cells, imbedded in a finely granular matrix; the granular matrix was no doubt albuminous fluid, coagulated by chromic acid.

The retina was, with the above exception, *in situ*, and even over the thin layer of subretinal effusion it was not raised perceptibly to the naked eye. The retina followed the abnormal curve of the outer coats at the staphyloma only with its outer layers, its inner layers retaining their normal curvature. Thus, opposite the bulging portion of the sclerotic and choroid the retina was thickened to the extent of nearly $\frac{1}{20}$ inch at the deepest part of the staphyloma. With the naked eye, and better when magnified, its structure could be seen at this part to consist of bands or pillars of semi-transparent tissue, stretching between its opposite surfaces. Examined with higher powers, it was found that the internal and external limiting membranes were well preserved, and indeed hypertrophied, and that between them stretched pillars formed of numerous sharply-defined, stiff, nearly parallel fibres. The fibres composing each pillar diverged at its outer and inner ends, and became split up into very numerous fine filaments, which passed into, and formed the two limiting membranes. These pillars were therefore the fibres of Müller, immensely overgrown both in length and number. Neither nerve layer nor rods and cones were present. The granular layers, however, could easily be recognised, more especially the outer granular layer. The granules of these two layers were scattered about among the diverging fibres of the hypertrophied Müllerian pillars, close to the inner and outer limiting membranes respectively. In some cases, granules of the outer layer could be seen passing inwards for a considerable distance among the fibres of a pillar. Occasional circular spaces were formed in the Müllerian pillars by the divergence of their constituent fibres. Viewed from the outer surface, the external limiting membrane was seen to be perforated by numerous large holes, or rather, it seemed to be composed of a network of fibres with round meshes of large dimensions (an exaggeration of the normal appearance). The retina in the neighbourhood of the staphyloma had all its layers well preserved, if we except the nerve-fibre and nerve-cell layer, which were ill marked. The optic disc was deeply cupped up to its margin.

DOUBTFULLY SYPHILITIC.

- * † 14. *Eye inflamed in infancy—Later, Iritis—Great enlargement of Anterior Chamber—Slight bulging of Sclerotic—Detachment and Fibrous Degeneration of Retina—Inflammation with great Œdema of Choroid, Ciliary Muscle, and Suspensory Ligament—Fibrinous Cyst on Inner Side of Choroid—Highly albuminous Character of Fluids in Anterior Chamber and Sub-retinal Space.*

Mr. —, æt. 19, Mr. Hutchinson's patient. In infancy he suffered from a severe eruption, the nature of which was uncertain, and at the same time one eye inflamed badly. There were no other facts in the patient's family history, nor any other symptoms in himself leading to a suspicion of inherited syphilis. All history of injury was denied. Recently the eye had become painful. After removal, the T. was —. The cornea appeared enlarged in every direction, and measured more than $\frac{1}{2}$ inch in its widest diameter. A linear transverse opacity, attended by slight puckering, occupied the central half of its width, and two denser spots were present at the centre of the linear opacity and at its end respectively. The sclerotic was squared, probably from bulging between the recti. The aqueous was clear, and the iris greenish. The pupil was closed by a thin membrane. After hardening for four days in chromic acid the eye was divided into anterior and posterior halves, and the front half again bisected from before backwards.

The sclerotic was somewhat thickened at the line of section, but showed nothing else noteworthy to the naked eye. The cornea was a little flattened at its centre, but seemed to spring by a sharper curve than usual from the sclerotic. The anterior chamber was very deep, and measured $\frac{3}{8}$ inch at its deepest part. It contained coagulated albuminous fluid, without any inflammatory corpuscles. The iris was somewhat bulged forwards at its central part, and by this means the anterior chamber became of nearly equal depth in all parts; the iris was in contact with the lens. A fibrous membrane, containing many inflammation corpuscles, stretched across the pupil. The lens was slightly shrunken, flattened on its posterior surface, and opaque. Its anterior capsule was normal, but the superficial layer of lens substance was fibrous looking and granular when examined with the micro-

scope. The retina was detached in the form of a cone, its apex being at the optic disc, its base blended with fibrous thickening at the back of the ciliary processes and hyaloid fossa; it was much thickened, and enclosed no appreciable amount of fluid. It consisted solely of the fibrous and corpuscular elements of the retina. The space between choroid and retina was filled by curdy, granular, whitish material, which became transparent and viscid in solution of soda, and was probably albuminous. It contained numerous cholesterine plates, and many small needle-shaped crystals. The granular material consisted in some parts of minute structureless particles, in others, of highly refracting globules, adhering to each other in heaps, and reminding one somewhat in appearance of the calcareous concretions in the pineal body: the globules were never, however, arranged in regularly spherical masses. They did not dissolve in ether, or in mineral acids, but became soft, and lost their outlines entirely in soda; they were probably albuminous concretions. Imbedded in this material, just within the choroid and beneath one of the slight bulgings of sclerotic, was a little globular body, as large as a small shot, smooth, grey-brown, and quite free. The granular matter around it was of a dark brownish-red colour. This body consisted of a laminated cyst, containing granular pigmented masses of irregular size; it was probably a fibrinous cyst enclosing an old blood clot; no foreign body was detected. An examination of the choroid showed its epithelium to be absent in most parts, and represented in others by irregular pigmented masses, and the elastic lamina could not always be seen. The granular albuminous material of the subretinal space adhered firmly to the inner surface of the choroid. In many parts the elastic lamina was seen to give off, or pass inwards into, branching processes, having a vitreous refraction and becoming blended inwards with the granular matter. Between these highly refracting stems and branches were enclosed spherical spaces, filled with material of a different refracting power, and quite structureless, probably incipient colloid bodies. The chorio-capillaris seemed normal. The deep layer of the choroid was, however, much altered. Its stroma was infiltrated, and opened up, in some parts very widely, by finely granular albuminous effusion, and there was an abundant production of large oval inflammatory corpuscles in close connection with the stellate pigment cells,

and also around the congested blood-vessels. These cells had very much the same refraction as cartilage cells. The ciliary processes were atrophied, and a considerable distance from the margin of the lens, their hinder surface being covered by a layer of toughish white material, and their folds quite lost. Occupying the region of the ciliary muscle, as far forward as the ligament: irid: pectinatum, was a layer, $\frac{1}{16}$ inch thick, of the same finely granular albuminous material as that in the anterior chamber, containing, however, some of the stellate pigment cells of the part, and large nucleated oval corpuscles. The suspensory ligament of the lens was similarly infiltrated, and enormously swollen by albuminous fluid and inflammatory corpuscles of smaller size than those in the ciliary region.

EYES LOST AFTER SMALL-POX AND FEVER.

15. *Staphyloma of Cornea, with thickening of Staphylomatous tissue (? after perforating ulcer); following Small-pox.*

The eye of one of Mr. Bowman's patients; it was lost after small-pox. The cornea was staphylomatous, showed a large central opacity. On opening the eye, the cornea was found much thickened at its central part, where also the staphylomatous bulging was most marked. The iris was thinned, and in contact with the cornea; there was no well-defined pupil. The other structures appeared (to the naked eye) normal.

16. *Post-variolous perforating Ulcer of lower part of Cornea—Subsequent blow on Eye—Suppuration of Vitreous.*

Henry Whellams, æt. 4 years; under the care of Mr. Streatfeild. He had had small-pox four months before excision; his right eye became inflamed immediately after the small-pox, according to the statement of his friends. He attended as an out-patient for five weeks, the eye remaining quiet, when one week before excision he fell on his face, and in all probability struck his eye, for it rapidly became very painful and much congested. At the date of operation, the conjunctiva was much congested; the upper half of the cornea was clear, but the lower part was converted into a large and prominent opaque staphyloma. It was opened a fortnight later by a horizontal antero-posterior

section. The staphylomatous part of the cornea was thickened; the iris was in contact with it, and the transparent lens pushed forward. The vitreous was in a state of recent suppuration. The retina was *in situ* everywhere, but was in parts of a patchy yellow colour. Near to the disc, and in one or two other parts, the retina adhered to the suppurating hyaloid, and the two together formed a swollen yellow membrane, between which and the choroidal epithelium, there was a layer of pus. The choroid appeared, to the naked eye, to be healthy.

17. *Staphyloma of the Cornea (after perforation?), following "Fever."*

An eye removed by Mr. Streatfeild, and showing a staphylomatous condition of cornea with the iris spread out on its posterior surface. The other structures looked (to the naked eye) normal. It was said to have been lost after "fever," five months before excision.

EYES LOST BY ULCERATION AND SLOUGHING OF CORNEA.

18. *Perforation of Cornea by "Ulcus Corneæ Serpens"—Iris and Lens pushed forwards—Choroid stretched—Subretinal albuminous effusion.*

A middle aged man, Mr. Hutchinson's patient, attending for "ulcus corneæ serpens." He attended for more than four months, refusing iridectomy in the first instance, and when the eye was lost, declining excision also for several weeks. At the date of excision, on May 11, 1871, the lost eye was congested and painful. The cornea seemed to have given way in two or three places, the perforations having closed again. The cornea was opaque and irregularly staphylomatous.

The globe was divided antero-posteriorly three weeks afterwards. The iris was thinned, and, as Mr. Hulke aptly terms this condition, "frayed out" on the posterior surface of the cornea. The lens was pushed forwards. The choroid at its passage into the ciliary processes was diffusely thinned, and in addition, presented numerous patches of abrupt absence of pigment, through which the sclerotic could be seen; these formed a complete narrow zone. In shape these patches were semicircular or crescentic, and in all cases the concavity of the curve looked forwards. They

were probably the result of stretching. Between the choroid and the retina, there were very numerous dots and small patches of opaque whitish yellow flocculent material, which at the ora serrata formed an almost continuous zone; it was composed of fine granular matter and oil globules, with some rather doubtful small inflammation cells. The retina appeared normal to the naked eye.

19. *Recent Suppuration in a lost Eye—Eye lost many years—Old detachment of Retina with inflammatory thickening in Ciliary region and Hyaloid Fossa, probably after perforation of Cornea—Recent ulceration of Cornea, and suppuration in subretinal space.*

Geo. A. C., æt. 22, under the care of Mr. Critchett. The eye had long been lost, and lately had become painful. After excision T—. On the cornea was a large ulcer occupying $\frac{1}{3}$ of its area. The iris was in contact with the cornea, and drawn towards the ulcer, but there was no perforation. Probably the cornea had formerly been perforated, and had ulcerated again lately. The eye was of good size and shape. Hardened in spirit, and divided in the antero-posterior direction, through the optic nerve. Iris thinned out and in contact with cornea. Lens nearly spherical, small, and pushed forwards. Ciliary processes thinned. There was much tough white tissue of old date in and about the suspensory ligament, and in the position of the ciliary muscle. The retina was detached, except at the optic disc, and could barely be recognised as a toughish membranous substance prolonged from the disc towards the middle of the eyeball. The large subretinal space, and small remains of vitreous quite full of recent yellow pus, the corpuscles of which had not undergone any degeneration. The choroid was in many parts devoid of pigment, but I could not be sure that this was not due to carelessness in roughly removing the pus, which adhered to the inner surface of the choroid in many parts.

EYES LOST BY PURULENT OPHTHALMIA IN INFANCY.

- *20. *Left Eye T +—Unusual Pigmentation of Retina secondary to Choroiditis—Optic disc cupped—Choroidal disease at yellow spot, &c.—Stretching of Anterior part of Choroid, following perforation of Cornea.*

Harriet Garling, æt. 31, under Mr. Streatfeild's care. She

lost both eyes from purulent ophthalmia in infancy; the right was painless and shrunk. The left eye had recently become inflamed and painful. Before excision it was noted that the cornea was slightly staphylomatous, and universally opaque with denser white dots; there was recent ulceration at the centre, and the cornea was vascular. T + 1. The eye was put into glycerine and water for a few days, and then divided into an anterior and posterior half.

The choroid and retina were not displaced. There was no lens. The iris was in contact with the cornea, and irregularly thinned. The choroid showed extensive atrophic changes affecting both its epithelium and stroma. The epithelium was everywhere irregular, and in some parts quite absent. Surrounding the disc was an irregular ring of completely atrophied choroid, joined at one part to another large patch of the same kind; over this area the sclerotic showed through the choroid. The epithelial pigment was here collected near one side of the patch into irregular islands made up of round black and brownish black dots separate or aggregated into large masses; a narrow imperfect ring of the same pigment was situated at the rim of the optic disc. Another patch as large as the disc, and of the same kind as the one already described, occupied the region of the yellow spot, but the pigment masses here occupied the centre of the patch. The ciliary processes at their commencement were detached from the anterior margin of the choroid over nearly half the circumference of the globe. This detachment had the appearance of a rent, being quite narrow at each end, and about $\frac{1}{12}$ inch wide at its middle; it was probably due to stretching of the iris and ciliary processes after perforation of the cornea. The optic nerve was wasted. The optic disc was rather deeply but not quite uniformly cupped up to its margin. The retina was very curiously pigmented in the equatorial region. The peculiarity consisted in the presence of elongated patches of pigment from $\frac{1}{4}$ to $\frac{1}{2}$ inch in length, and from $\frac{1}{12}$ to about $\frac{1}{8}$ inch in width, tapering at each end, and arranged with their greatest length in the antero-posterior direction; two of them began at about $\frac{1}{8}$ inch from the disc, the rest at greater distances; one or two came forward as far as the ora serrata. There were seven or eight of these pigmented tracts. When magnified about 30 diameters they were seen to consist of irregular networks of stellate and branched lines, composed of masses of coal-black pig-

ment. In general arrangement these networks resembled that of the retinal capillaries, and some of them were prolonged for some distance in almost straight directions, as if following the course of vessels. In some parts these lines and the meshes of the network were made up more or less clearly of a double row of pigment spots highly suggestive of arrangement around or along vessels. At the cut edges of the retina, and less satisfactorily in thin sections, examined under high powers, the pigment masses could be seen to occupy the inner part of the retina. When the retina was stripped from the choroid it was noticed that the epithelial lining of the latter membrane was absent from the parts covered by the pigmented retina. Some vertical sections of the retina were made after the eye had been for about a fortnight in glycerine and water, and without hardening. No stratification could be made out except a trace of the nerve fibre layer and hyaloid covering it, giving an ill-defined longitudinal fibrous appearance. The rest of the retina was quite granular. It was not possible to make out anything very certain as to the relation of the pigment to the retinal layers, but most of the masses seemed nearer the inner surface. There were, besides the larger dots and patches, very numerous minute granules of dark brown pigment pretty evenly distributed through the retina.

GLAUCOMATOUS EYES.

21. *Glaucoma (Acute) with Secondary Cataract—Iritis occluding the Pupil—Peripheral Choroiditis—Great Enlargement of part of Posterior Chamber, forming a Circumscribed Staphyloma of Sclerotic in Ciliary Region; diffuse thinning of Sclerotic—Albuminous alteration of Aqueous and Vitreous—Subsequent Glaucoma of other Eye.*

Esther R., 52, under Mr. Bowman's care. The notes of condition before excision kindly supplied by Mr. Rogers. Had seen "rainbows" before right for years. Acute glaucoma two years before excision, followed by several other attacks, and ending in total blindness a year before. The left eye had suffered in much the same way, but more recently, and was not so much damaged. Before excision, right eye, T + 1; shallow anterior chamber; secondary cataract; large, semi-transparent

staphyloma in ciliary region above, as if sclerotic were ruptured. Other eye, T + 2, and the other signs of advanced glaucoma.

After excision, a staphyloma, of about the size and shape of a small haricot bean, was found in front of and between the internal and superior recti; it just involved the corneal edge. The whole of the neighbouring sclerotic was slightly staphylomatous. The pupil was rather dilated and triangular, with the apex pointing downwards and inwards; its margins seemed adherent to the lens capsule. Hardened in chromic acid and divided nearly vertically in the antero-posterior direction.

Anterior chamber shallow and occupied by highly albuminous (coagulated) fluid, containing no inflammatory growths. Pupil closed by a thin membrane, which adhered to the lens capsule. Lens in its normal position, semi-opaque in its centre, and of dark, somewhat horn-like colour. The ciliary processes were short, somewhat shrunk, and $\frac{1}{4}$ inch distant from the lens. Suspensory ligament of lens elongated. Optic disc deeply cupped. Retina *in situ* everywhere. Vitreous shrunk to $\frac{1}{3}$ its normal bulk, and drawn forwards to the hyaloid fossa and ciliary region. Posterior $\frac{2}{3}$ of the vitreous chamber, filled by albuminous fluid. The choroid was diseased in its equatorial part, where there were a number of atrophic patches, some with, others without pigment accumulations at their margins. The sclerotic showed nothing abnormal except the staphyloma in the upper ciliary region. It was there abruptly bulged outwards, and considerably thinned; numerous blood-vessels ramified in the staphylomatous part. The inner surface of the staphyloma was lined by a thin layer of the uveal tract, with sparsely scattered pigment cells. Its cavity contained fluid, which was not coagulated by the chromic acid. The anterior and lower margin of the staphyloma just involved the edge of the cornea, which was there thickened and split into an inner and outer lamina by the cavity of the staphyloma. The thin pigmented lining of the staphyloma was continuous with the posterior surface of the iris, and from this layer imperfect septa projected a short distance into the staphylomatous cavity. The ciliary processes were not at all involved in the bulging, their outer surfaces being, as it were, dissected from the sclerotic and forming part of the posterior wall of the staphyloma, this boundary being completed by the suspensory ligament of the lens. It has been before mentioned

that the pupil was occluded, and in this way communication cut off between the anterior and posterior chambers. It thus appears that the staphyloma in this case was caused by an immense dilatation of a limited part of the posterior chamber, and that it did not communicate with either the vitreous or anterior chambers. It was therefore, in all probability, secondary to the occlusion of the pupil, and may be compared to those much commoner cases in which, when the pupil is closed, the iris is bulged forwards into cyst-like protuberances by accumulation of fluid behind it; the chief difference being that in the latter cases the eye does not become larger, whereas in the specimen here described the contents of the globe were increased by the volume of the staphyloma.

We have still to seek a cause for the yielding of the sclerotic in preference to the iris. Bearing in mind the vascularity of the staphylomatous part, the equatorial choroiditis, and the altered condition of the vitreous, we may infer, with great probability, that a local inflammatory process, attended by softening, was set up in the sclerotic after the occlusion of the pupil, and that the sclerotic thus became the least resisting of the boundaries of the posterior chamber.

†22. *Acute Glaucoma 3 Years before Excision—Symmetrical Equatorial Staphyloma—Detachment of Retina—Atrophy of Choroidal Stroma with Colloid Disease of Elastic Lamina—Lens Opaque.*

Mr. —, æt. 55, a patient of Mr. Critchett's had an attack of acute glaucoma in one eye 2 or 3 years before excision; sight was lost in a few days. Lately the eye had become painful. When Mr. Critchett saw him the eye was quite blind, the pupil large, and the lens opaque. The peculiarity of the case consisted in the existence of a considerable staphyloma of the sclerotic on each side of the globe behind the internal and external recti muscles. The coats of the eye were here so thin that they burst when the eye was put into glycerine and water. It was afterwards hardened in chromic acid, and an antero-posterior horizontal section made through the staphylomata.

The anterior chamber was very shallow, and contained coagulated (albuminous) fluid. Lens opaque at its centre. The retina

was detached in umbrella form as far forwards as the staphylomata at the equator, where it remained adherent. In the subretinal space, which was not very large, there was a great deal of granular and coagulated material containing pigmented masses and many oil globules. The retina was much degenerated, and its normal structure not distinguishable. The optic disc was moderately cupped. The vitreous still occupied a considerable space; it was coagulated, opaque, and although quite soft it had a very distinctly fibrous arrangement, tearing and splitting easily in the antero-posterior direction only. It was composed of large fibrinous looking bands and cords, with numerous scattered round inflammatory cells containing single nuclei, and many highly pigmented spherical granular masses. The choroid varied in different parts. Near the disc its epithelium cells remained in some parts of good shape and size, and in close apposition, while in others they were altered in form, position, and colour, and reduced to masses of irregular granules. In the staphylomatous part they were more highly pigmented, had become rounded and somewhat shrunk, while they were quite absent over large patches. The elastic lamina near the disc was normal; in the staphylomatous part numerous colloid bodies were attached to it. There was nothing obviously amiss with the chorio-capillaris at the back of the eye, but the deeper layers in the same situation were oedematous and atrophied, their structure being opened up into large circular spaces containing coagulated material and circular bodies like myeline, while the stellate pigment cells were small and seemed to have lost their processes, for they appeared as oval, or even round pigmented cells, of smaller size than the healthy cells of this part. The choroid at the bulging parts was very much thinned, and too adherent to the sclerotic; the stellate pigment was here deficient in many parts, and distributed irregularly. The sclerotic was considerably but not abruptly, thinned at the staphylomatous parts.

23. *Disseminated Choroiditis in both Eyes, with Secondary Pigmentation of Retina—Glaucoma, probably Secondary to the Choroiditis, in Right, and followed by Cataract—Double Iridectomy—Excision of Right—Illness during Lactation at time of first Failure of Sight.*

Mrs. P., æt. 47, Mr. Hutchinson's patient. *History.* 18 years

before excision of her right eye the sight of both eyes failed, so that she was "almost blind" for several weeks; she asserted that the eyes were not inflamed at the time. This was during an illness in which she lost the use of her left limbs, and had severe pain in the left forehead and left side of the body. The illness was of 3 months' duration, and occurred during lactation, but she recovered her sight perfectly in a few weeks after its failure. She took much calomel and was salivated by it. 9 years later the right eye again failed, and presently became all but blind, in which state it remained ever afterwards. She had known of the cataract for 3 years. For a year and a half the left eye had been gradually failing. In the spring of 1870 double iridectomy was done elsewhere, but she did not know why the operations were considered necessary. She had lived for many years in India, and while there she often had ague. For years she had been liable to severe frontal pain, latterly worse on the left side; quinine sometimes seemed to cure the pain. For 2 or 3 years she had been getting deaf on the left side. She had had a large family, and many of her children had died in infancy, but there was no clear history of syphilitic symptoms in the patient or her children.

Condition of Eyes on Admission. Right, Lens opaque, iridectomy has been done, can see light, no signs of iritis. Left, iridectomy has been done, no signs of iritis, opacities in vitreous. Large patches of choroidal atrophy around disc and at periphery, and in latter position star-shaped collections of pigment as in retinitis pigmentosa, but only on patches of choroidal atrophy. Disc of good colour, not waxy. Sees large letters. The right was excised several months later, being useless, and a source of mental irritation to the patient. It was hardened for 3 weeks in chromic acid, and divided into anterior and posterior halves.

The vitreous and hyaloid, rendered opaque by the solution, were removed. Iris had been removed well up to ciliary margin at the iridectomy; its pigment disturbed and atrophied. Lens much shrunk and displaced outwards. Ciliary processes atrophied. Choroid showed extensive signs of long-standing disease; its epithelium was nowhere normal, being, even in the least affected parts, irregularly disturbed and collected into minute circular dots as large as several hexagonal cells. The stroma was much atrophied; around the disc, at the yellow spot,

and in various positions nearer the equator, it showed large irregular patches of diffuse thinning with absence, more or less complete, of stellate pigment. On some of these there were many large star-shaped accumulations of coal-black pigment (altered epithelium). The earlier stages of formation of these large patches could be seen in very numerous little circular, sharply-defined patches of atrophy, with or without marginal or central pigment accumulation. Optic disc pale and deeply cupped. Retina everywhere in apposition with choroid; in its substance were a great many small round pigment dots, blackest at their centres, and composed of small granules. Many of these pigmentations of the retina were distinctly in front of the retinal vessels. The structures were not examined with high powers.

NEW GROWTHS.

*24. *Glioma of the Retina sprouting into the Vitreous—Extension of the Disease into the Optic Nerve, and Transplantation on to the Choroid.*

George Croydon, æt. 3 years, living at 30, Henry Street, Deptford, came under Mr. Critchett's care early in January, 1871, with a history that "something white," which "seemed to float about," had been noticed in the pupil for about a month. The diagnosis of detachment of the lower and outer part of the retina was made. The child continued to attend, and it was found that the detachment gradually increased in size, and that it finally encroached upon the central and upper parts of the vitreous space, and could be seen as a pinkish-white mass quite easily, without the assistance of either mirror or lens. The iris was gradually pushed forwards, and at last was in contact with the cornea. The tension was latterly somewhat increased, and the pupil dilated, but there was no evidence that the eye was painful. Finally there were signs of iritis in slight irregularity of the pupil and the presence of adhesions. The presence of a new growth became certain in May, and on the 23rd of that month Mr. Critchett removed the eyeball. With reference to the child's health previous to the eye affection, there is nothing of importance to note; he had had "congestion of the brain" at the age of a year and a half, and had passed through

whooping-cough and "glass-pock." He was a healthy looking boy.

The eye was divided vertically in the antero-posterior direction. The retina retained nearly its normal curvature, but was very slightly detached from the choroid in a few places. It was almost everywhere much thickened and semi-opaque, but some parts were still transparent. Sprouting from its inner surface, and nearly filling the vitreous chamber, were numerous very soft, slightly translucent, pinkish-white growths; they were irregular in size and shape, ragged on the surface, and imperfectly isolated from one another. One, much the largest, occupied the lower and outer part of the retina, filled more than half of the vitreous space, and involved the optic disc. The remains of the vitreous space itself contained irregular, shreddy, and pulpy bits of the tumour, detached no doubt chiefly by manipulation, also numerous specks, and small masses of opaque yellowish material, of curdy and gritty consistence, and lastly bloody fluid containing abundant recent clots. The posterior surface of the lens capsule was covered with shreddy growths, most abundant at its circumference. The lens itself was transparent, and not displaced. The outer surface of the retina was smooth everywhere, except at the lowest part of the eye; here, where the new growth was thickest, the outer surface of the retina was somewhat lobulated, and over a large patch below the optic disc it was rough. The choroid of the nasal half was examined everywhere, in the temporal half only the part in the neighbourhood of the optic disc. Below the disc, and corresponding with that part of the retina which was rough on its outer surface, the choroid was covered by a thin layer of opaque, white, new growth. In the front of the eye the ciliary processes were more or less adherent to the outer surface of the much thickened retina. No thickening was observable at any part of the choroid. The iris appeared (to the naked eye) quite healthy, the gliomatous growth having passed no further forward than the suspensory ligament.

The new growth, examined while quite fresh, appeared to be entirely cellular; I could find no trace of fibrous structure. The cells were all, or almost all, round; in size they varied, the immense majority being small, while a moderate number were considerably larger, but more faint in outline. Some of these large cells showed single nuclei, but the small ones appeared

quite uniform until they had been kept a few days in dilute glycerine, when most of them showed one or more minute bright dots. I noticed a very few nucleated spindle-shaped cells, of no very constant size, and perhaps not properly parts of the new growth. The curd-like masses consisted of the elements of the tumour undergoing fatty and calcareous degeneration. The growth contained numerous loops of large capillary vessels. On examining a transverse section of the optic nerve, about a line from the eyeball small cells were found in the fibrous septa between the bundles of nerve-fibres. These cells had the same size and characters as those forming the bulk of the retinal tumours; they were frequently arranged in groups containing from four or five to more than a hundred cells, but many scattered cells were seen which could not be distinguished from those in the groups. From the abundance of the glioma cells in this part, we may probably infer that the proximal end of the divided nerve was infected to some extent at the time of the operation, and that an extension of the disease will take place more or less speedily along the nerve trunk and into the brain.

Portions of the thinnest and most healthy-looking part of the retina were hardened in chromic acid, and vertical sections examined microscopically. All the layers except the rods and cones could be made out with tolerable ease in the transparent parts of the retina, but in parts thickened and rendered opaque by abundant gliomatous degeneration, only masses of pure glioma tissue were seen. Even in those sections which showed best the normal stratification of the retina, the relative thickness of the different layers was altered. This alteration consisted in overgrowth of the granular layers, and especially of the *outer* granular layer; there was also very marked overgrowth of the connective-tissue (radiating) fibres in the outer part of the retina. It would thus seem that in its earliest stage the gliomatous degeneration affected, at least in some parts, the *outer* layers of the retina; and although I have not been able, satisfactorily, to show in microscopic sections that it subsequently penetrated the inner retinal layers, yet it is certain, from the foregoing description, that this must have occurred. Only in one part had the growth sprouted towards the choroid, and it was just at that part that a thin layer of glioma tissue was adherent to the inner

surface of the choroid. In the choroid no clusters of glioma cells could be found. Sections made where the choroid was covered by the layer of new growth showed characteristic heaps and clusters of glioma cells resting upon the inner surface, but nowhere penetrating beneath the elastic lamina. The hexagonal pigment cells in the immediate neighbourhood of the glioma clusters became irregular, and disappeared altogether on the parts occupied by the new growth, and even over a narrow belt surrounding each island of glioma. In the ciliary processes, where the pigment cells are several layers thick, no disturbance seemed to have been caused by the adhesion of the glioma cells to the inner surface of the uveal tract. No glioma clusters were seen in the outer layers of the ciliary region.

25. *Glandular Tumour of Eyelid of somewhat unusual character.*

Mr. Streatfeild removed this specimen from the left upper eyelid of a girl aged 11 years. It had attained the size of a raspberry, and the patient said that it had been growing for a year. It projected considerably from both surfaces of the lid, but was not adherent to the skin. It was not painful.

When an incision was made into the tumour from the conjunctival surface, no tarsal cartilage was recognized, and the growth was found to be solid and uniformly firm throughout; its cut surface did not bleed. It was removed together with the closely adherent conjunctiva. There was no capsule, but the deep part of the tumour (that nearest the skin) easily separated from the subjacent muscle. The section of the tumour had a yellowish colour, and a finely granular structure, which was more easily seen with the aid of a lens; the individual granulations projected slightly from the surface. Thin sections showed that it was composed of very numerous gland follicles, with considerable overgrowth of the connective-tissue elements of the gland. The follicles were in many instances branched or furnished with secondary pouches. Some of the follicles became elongated and narrowed as if about to pass into ducts.

The large size, uniform firm fleshy texture, absence of cyst-wall, and relative abundance of hypertrophied connective-tissue, are points in which this glandular tumour differed from the common tarsal cysts.

26. *Inflammatory New Growth from the Sclerotic.*

This specimen was removed by Mr. Bowman from the left eye of a woman aged 30; it was situated near the inner canthus. Before removal, it appeared as a small rounded swelling beneath the conjunctiva, and not at all adherent to this membrane. The woman had not noticed it for long, and it had given her no pain. There were no signs of inflammation about it. Mr. Bowman cut it off, together with the overlying conjunctiva on a level with the sclerotic. It was firmly adherent to and seemed indeed somewhat imbedded in the sclerotic, so that probably a part of the growth was left *in situ*. The part removed was as large as a mustard seed, firm, and of a yellowish-white colour. It consisted of fibrous tissue arranged in the form of a wide mesh-work, and everywhere infiltrated with inflammatory products of low development and undergoing degeneration. The structures alluded to were pus-like corpuscles for the most part becoming granular, large spherical granule cells, numerous free small granules, and a few spherical masses with a radiating crystalline structure. The pus-like cells were far more numerous than any of the other elements. I could not find anything like a pus-containing cavity (the fibrous network being present everywhere), so that the term abscess can scarcely be applied to the growth, although it contained cells which I could not distinguish from pus.

†27. *Tubercles of the Choroid in a case of Acute Tuberculosis.*

Geo. E. W., æt. 40, was under the care of Dr. Ramskill, in the London Hospital, suffering from acute tuberculosis. At the *post-mortem* immense numbers of miliary tubercles were found in the lungs, peritoneum, beneath the capsule of the kidneys, in the tunica vaginalis, and a few similar bodies in the pia-mater at the base of the brain. The patient had not complained of amblyopia during life, and the eyes were not examined with the ophthalmoscope. The back of the left eyeball, including more than half of the globe, was removed for examination after death. The retina was in apposition with the choroid. A number of small, whitish spots were seen beneath the retina, and they could be distinguished as semi-transparent dots through the sclerotic when the eye was held up to the light. When the retina was removed,

these dots were found to be little whitish elevations of the choroid. The choroidal epithelium seemed, to the naked eye, to be quite absent from most of them, but one or two of the smallest were still brownish on the surface. There was no pigment accumulation around their bases, the choroid appearing quite normal up to the commencement of the elevations, and there seeming to lose its epithelium rather suddenly, but not so abruptly as to leave a very sharply-defined edge. The elevations themselves were whitish and slightly translucent. There were nearly a dozen of them, and they were distributed about the back of the eye, none being present in the equatorial region. There were several spots, near the equator, of choroidal atrophy with marginal pigment accumulation, and without any elevation of surface; these were probably of old standing, and had nothing to do with the recent miliary tubercles. No microscopic examination of the tubercles was made. This specimen is preserved in the museum of the London Hospital Medical College.

*†28. *Tubercles of Choroid in a case of Acute Tuberculosis.*

The backs of the eyeballs of Thos. W., æt. 32, a patient in King's College Hospital. Presented by Mr. Francis Warner. The patient had been getting thin for 12 months, and had had a cough with expectoration, occasionally blood-streaked, 3 months. He was ill for a few weeks, and died a few days after admission into the hospital. His temperature ranged from 99·5 to 103. At the *post-mortem* abundant miliary tubercles were found in the lungs, liver, spleen, and kidneys. There were no tubercles visible to the naked eye in the pia-mater, but there was considerable opacity of the arachnoid, and an increase of subarachnoid fluid. There were ulcerations at the posterior part of the vocal cords. Several of the mesenteric glands were enlarged, and contained cheesy matter. The tubercles in the choroid in these specimens were less numerous than those in the one before described, but had precisely the same naked-eye characters. They were not examined microscopically.

Besides the specimens marked above as preserved in the Museum, the following microscopic objects have been added:—

1. Injection (transparent) of the lens capsule of a kitten, $2\frac{1}{2}$ days old.
 2. The cornea of the same kitten showing the vascular loops at its margin injected.
 3. The pupillary membrane of the same kitten imperfectly injected.
 4. Injection (opaque and incomplete) of the chorio-capillaris of a horse (two preparations).
 5. Section of optic disc and neighbouring retina from a specimen of recent acute neuritis (No. 2 in "Report").
 6. Vertical section of choroid with a cluster of glioma cells growing on it. Also a piece of the infected choroid for examination of its inner surface. (From No. 24 in "Report").
 7. Sections of the deposit preceding the formation of a rodent ulcer.
 8. Sections of a remarkably deep glaucomatous cup.
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Javal's Optometer for determining Astigmatism has been presented to the Museum by Mr. Bowman.

The Books in the subjoined List have been added to the Library during the quarter:—

- RUETE. *Lehrbuch der Ophthalmologie*. 2 vols. 1855.
- DIXON. *Diseases of the Eye; a Treatise contributed to the 2nd Edition of Holmes's System of Surgery*. 1870.
- GALEZOWSKI. *Du diagnostic des Maladies des Yeux par la Chromatoscopie Rétinienne*. 1868.
- WILSON. *Lectures on the Theory and Practice of the Ophthalmoscope*. 1868.
- HELMHOLTZ. *Optique Physiologique*. Traduite par E. Javal et N. Th. Klein. 1867.
- STELLWAG VON CARION. *Treatise on Diseases of the Eye*. Translated by C. E. Hackley and D. B. St. J. Roosa. 1868.

JAGO. Entoptics. 1864.

MACNAMARA. Manual of Diseases of the Eye. 1868.

JACOB. Inflammations of the Eyeball. 1849.

SCHEFFLER. Ocular Defects. Translated by R. B. Carter.
1869.

NUNNELEY. The Organ of Vision. 1858.

FOLLIN. Sur l'exploration de l'Œil. 1863.

MACKENZIE. Traité Pratique des Maladies de l'Œil. 4th
Edition par le Doct. E. Warlomont et A. Testelin.
1858.

KNAPP. Tumours of the Globe.

WECKER. Traité Theorique et Pratique des Maladies des
Yeux. 2nd Edition. 1867.

ARLT. Krankheiten des Auges. 1860—63.

KNAPP and MOOS. Archives of Ophthalmology and Otology.
Vol. I. No. 1. 1869.

WHARTON JONES. Failure of Sight from Railway and other
Accidents. 1869.

NOTE ON A NEW METHOD OF PRESERVING AND MOUNTING
EYES FOR EXAMINATION BY THE NAKED EYE OR BY LOW
POWERS OF THE MICROSCOPE.

By EDWARD NETTLESHIP, F.R.C.S., Curator to the Hospital.

It is very desirable to be able to mount eyes and many other small specimens in some preservative material sufficiently thick to prevent the object from moving about, and which, at the same time, will neither render the specimen opaque (as spirit does), nor cause it to swell and become too transparent, as is the case when glycerine is employed alone. If the preservative does not evaporate so much the better, for then we need take no special precautions about cementing the cover-glass.

I believe that glycerine jelly will be found to fulfil all the above conditions exceedingly well in most cases. My own experience of this substance is at present very limited both as to the number of specimens mounted in it and the time which has elapsed since they were put up. I have hitherto mounted only about 20 specimens, and the oldest of them has not yet been preserved quite 3 months. The results on the whole are good but not perfect, and I shall be much obliged to others working at the same or kindred subjects who will kindly let me know of any improvements that may suggest themselves in the composition or use of the jelly.

The eye, before being mounted in jelly, must be soaked for several days in some preserving fluid, chromic acid fluid, spirit and water, or glycerine and water. In specimens which do not require to be hardened I have often used a mixture of 1 volume each of glycerine and methylated spirit with 2 volumes of water; this fluid preserves the structures without much alteration for several weeks at least; even the lens is scarcely changed by it. If the specimen has been hardened in chromic acid it is better

(after making the necessary sections) to remove the acid to a considerable extent, by placing the eye in weak solution of soda (about 1 volume of liq. sodæ, B. P. to 6 or 8 volumes of water; otherwise the chromic acid will stain the jelly of a dull-greenish colour. The soda solution also clears the retina when it has been made opaque by chromic acid, but the retina rendered transparent in this way is too soft for microscopical examination, so that any portions required for this purpose should be removed before the soda is used. The halves or parts of the eye thus hardened or preserved are then to be filled with the melted glycerine jelly, and the latter allowed to become solid. Care must be taken at this stage that the warm melted jelly quite fills all the small cavities and interstices in the eye, especially the anterior chamber, and the subretinal space in the case of a detached retina, &c.; if this precaution be not taken, and watery fluid occupy any part of these lesser cavities, the eye will afterwards become misshapen when placed in its bed of glycerine jelly. The watery fluid probably passes out into the jelly, while the latter, being solid, cannot replace the fluid, and thus the coats of the eye are pressed inwards. It is best to remove the remains of the fluid as far as possible with bits of blotting paper, before pouring in the jelly. The jelly should be poured into the small cavities through a tube with a capillary end, which can be introduced into the interstices, and into the lowest parts of the anterior chamber; in this way all watery fluid can be washed out by the warm jelly.

When the jelly filling the eye has become solid, the specimen may be permanently mounted in the glass cell by simply filling the latter with melted jelly, placing the eye in it, and putting the cover-glass in position carefully. In order to prevent leaving air bubbles between the cover and the contents of the cell, the latter must be very nearly full, and the cover be then slid into position from one side, and allowed to sink by its own weight into the enlarged mouth of the cell made to receive it. By gentle pressure any

superfluous jelly should then be squeezed out. The whole cell and cover should then at once be washed in a good stream of *cold* water, in order that the jelly which has been squeezed out may be thoroughly washed off; the whole is then to be carefully dried, and a layer of cement at once applied over the groove between the cover and the cell. Brunswick-black or Bell's cement answer very well, and probably gold size would do as well as either. If, instead of applying the cement at once, we leave the cell uncemented for several hours, until the jelly has quite set, we shall probably find that one or more bubbles of air have been sucked in by the contraction which the jelly undergoes in cooling. If the cement has been applied before the jelly cools, we shall find one or more drops of cement sucked in instead of air. The air-bubbles are not objectionable so long as the jelly remains solid, but if for any reason it ever becomes melted again, they may then float over the specimen and obscure some part of it; this will not occur with the drops of cement.

A few words on suspending the specimen. If we could quite depend upon the temperature of the jelly always remaining below melting point there would be no need in most cases to suspend the specimen, for when first placed in the cell the eye generally floats on the jelly and remains in contact with the under surface of the cover-glass in the best possible position. In a very warm room, however, the jelly sometimes becomes semi-fluid again, and the eye often sinks to the bottom of the cell when this happens; it has gradually absorbed the jelly and become of slightly greater specific gravity than it was when first mounted. For this reason I have suspended all the more recent specimens in the ordinary way by very fine threads of silk.

The jelly that I have hitherto used has been made by mixing equal volumes of pure glycerine and the palest calves-feet jelly; latterly I have added about 1 volume of creosote to each 500 volumes of the jelly, as a precaution,

and not because I had any reason to distrust the keeping qualities of that made without creosote. The calves-feet jelly was made specially for me by Messrs. Batty and Co., of Finsbury Pavement, and was of a pale-yellow colour. Made in this way the jelly costs a little less than $2\frac{1}{2}d.$ a fluid ounce, while that made by Rimmington is sold retail, at about 2s. for the same quantity. Rimmington's jelly is however, firmer, and sets more quickly than that which I have made, and these qualities are desirable, especially the increased firmness. I shall be much obliged to anyone who can tell me how to obtain a perfectly clear jelly which will remain solid at a somewhat higher temperature, and become firmer when cold than that made as above. If it could, in addition, be made quite colourless, it would be an advantage.

PART II.

A Periscope

OF

CONTEMPORARY OPHTHALMIC LITERATURE.

CHOROIDO-RETINITIS COMPLICATING CONVERGENT AND ALTERNATING STRABISMUS.

In the "Annales d'Oculistique," January—February, 1870, p. 84, is a note of a communication by Umé (Arch. Méd. Belges, 1870, t. xi, p. 18) on a case of choroido-retinitis complicating convergent strabismus. He calls particular attention to the causes of defect of vision, so frequently met with in the deviating eye. He says the cause ought to be made out by ophthalmoscopic examination before the operation, in order that the operator may know definitely the result likely to be attained as regards the restitution of binocular vision. He would abstain from operating, if he wished for anything but to remove the squint, in cases where affections of the fundus were visible which appeared irremediable.

THE ACTION OF ATROPINE ON INTRA-OCULAR TENSION.

In the "Annales d'Oculistique," March—April, 1870, p. 108, is a paper by Dr. Adamuk on the manner in which atropine acts in diminishing the tension of the eyeball. He considers that the intra-ocular tension is the result of the "lateral pressure" exercised (by the blood) on the (walls of the) vessels, and can, consequently, be diminished by diminution in the "lateral pressure" in the vascular system in general, or by augmentation of the "tonicity" (state of contraction) of the walls of the intra-ocular vessels. The former cannot be produced by the local application of atropine as commonly used; the latter cannot be measured exactly, and must be investigated indirectly. The means adopted by the author was to study the act of osmosis from the vessels, which he considers to be in inverse proportion to the "tonicity." After the use of atropine osmosis is diminished. If, on introducing a trocar into the anterior chamber of a non-atropised eye one obtains (for example) five

drops of aqueous in one minute, there will only escape from an atropised eye scarcely as much as three drops. Moreover any irritation of the conjunctiva, which would augment the filtration in a normal eye, no longer produces this effect in the same degree, if the eye be under the influence of atropine. He quotes an experiment (showing this).

The results of irritation of the great sympathetic show that, notwithstanding increased intra-vascular pressure, augmentation of "tonicity" (that is to say, of contraction of the vessels) is capable of producing diminution of osmosis, and it is reasonable to suppose that a similar explanation applies to the action of atropine. After section of the sympathetic, osmosis takes place twice as rapidly as normally occurs. Under the influence of atropine, the contracted vessels limit, by the condensation of their walls, the active transudation of liquids; moreover the walls exhaust a considerable part of the pressure of the blood, whence results a diminution of the extra-vascular pressure. It is in these two influences alone that one must seek for the cause of the relaxation of intra-ocular pressure which one notices during the action of atropine.

Further illustration may be obtained from the result of a rapid evacuation of the aqueous. The vessels enlarge so rapidly that extravasations are produced, unless the eye be under the influence of atropine, when no such accident occurs. This exception is explained by the augmentation in the tonicity of the walls of the vessels overcoming the pressure of the blood from within outwards. Again, if the anterior chamber be punctured, contraction of the pupil follows, depending, in great measure, on the dilatation of the vessels from diminished extra-vascular pressure. If the eye be atropised the pupil contracts but slightly, or even not at all. There is one apparent objection to the author's theory. It is well known that diminished intra-ocular tension produces increased ocular refraction, therefore, under the influence of atropine, the "far point" ought to approach nearer to the eye. This objection, however, disappears if it be allowed that when changes in the condition of osmosis from the vessels occur, that taking place in the lens is also modified. Such the author states is the case, as proved by Woinow. When osmosis from the vessels diminishes, the osmosis in the lens diminishes also, its surface becomes flatter, and the "far point" is removed from the eye.

Lastly, the fluid which transudes under the influence of atropine is less plastic than under normal conditions. This is important in cases where the lens, or the whole eyeball, has been much damaged. False membranes, or secondary cataracts, are less likely to form. Atropine ought to be used whenever either the anterior or posterior chamber has been opened. Analogous experiments have been made with Calabar bean, but in its pre-

sent form of application it excites so much irritation that the results cannot be depended upon.

The author gives the maximum diminution of intra-ocular tension, under the influence of atropine, which he has observed, as equivalent to six millimètres of mercury. To show the effect of atropine in preventing increase of tension, he stimulates the conjunctiva of a cat with liquid ammonia. The eye then shows (with the manometer) a tension of 33 mm. of mercury, having previously had a tension of 23 mm. He now instils atropine, and afterwards irritates the conjunctiva, the tension then only rises to 28 mm.

DEMONSTRATING OPHTHALMOSCOPE.

In the "*Annales d'Oculistique*," Mai-Juin, 1870, is a note of a demonstrating ophthalmoscope, invented by MM. Wecker and G. Roger (from the *Bull. de l'Acad. des Sciences*). The authors have tried to solve the problem of allowing two persons to see, at the same time, a sufficiently illuminated and well defined image. They make use of the total reflection obtained from the hypotenuse (surface opposite the right angle) of a rectangular prism, interposed in the course of the luminous rays. In the direct method of examination the inconveniences attendant on the use of a prism (decomposition of the light and deviation of the rays) are obviated by placing a second prism at the back of the first so as to form a parallelepiped. This juxtaposition of the prisms produces the same result as a thick plate of glass placed in the course of the light. As the system (of prisms) has no other influence on the direction of the rays of light than that of causing a slight lateral deviation, the lens ordinarily used can be added to it so as to make one apparatus.

The prismatic object glass, therefore, is composed of a plano-convex lens (which can be changed at pleasure) and of two rectangular prisms, whose hypotenuses are placed in juxtaposition back to back. The material employed was crown glass, and the angles of the prisms were of 42 and 48 degrees.

This instrument can be used in three different ways: (1) One observer illuminates the fundus in the ordinary manner by sending the light from the mirror through the object glass. He looks through the hole in his mirror. A second observer, placed at the side, looks on the surface of the hypotenuse of the prisms. (2) The first observer places himself at the side and uses his mirror so as to throw the light on the hypotenuses of the prisms, he thus illuminates the fundus, and views it through the hole in the mirror. The second observer places himself face to face with the patient and looks through the objective. (3) Both observers illuminate the fundus, each being furnished with a mirror, realising thus, simultaneously, the first two procedures. They

look through the holes in the mirrors, and have the benefit of a double illumination. The employment of the instrument is not limited to the exploration of the fundus of the eye, but may be used in conjunction with other apparatus for the examination of the various cavities of the body.

NEW OPHTHALMOSCOPE—M. JAVAL.

M. Gavarret gives a description of the instrument (*Gaz. Hebdomadaire*, 1870, p. 278, No. 18) constructed by Nachet (Jun.), from the directions of M. Javal. The three plates of glass, in the instrument of Helmholtz, are replaced by a single plate, on the surface of which is laid a thin layer of platina, so as to augment the reflecting power, and a (Galilean) combination of lenses (in a small compass) obviates the necessity of interposing various lenses before the patient's eye as in the old instrument. An extremely simple mechanism allows of instantaneous focussing which can afterwards be made as exact as can be desired. This ophthalmoscope also serves as an optometer, and that in two ways; either by allowing the patient examined to focus, or this may be done by the observer; a fact of great importance in certain cases of simulated myopia, for instance, also in veterinary medicine, for the instrument determines the glasses necessary for a horse as well as for the most intelligent man. By the substitution of cylindrical glasses for spherical ones, the instrument determines the amount of astigmatism present, with surprising rapidity. Lastly, this transparent mirror, coated with platinum, has furnished M. Javal with the means of showing the fundus of the eye, of a patient, to two persons simultaneously. The instrument, adds M. Gavarret, is doubtless susceptible of much improvement in various details, but it already answers well, and allows of the examination of the fundus under a higher magnifying power than has hitherto been possible (*Annales d'Oculistique*, Mai-Juin, 1870, p. 287).

GLIOMA OF THE RETINA.

Iwanoff (de Kien), in the *Journ. de l'Anat. et Physiol.* 1870, No. 3, p. 225, remarks on a case, cited by Hirschberg, in which the first evidences of glioma had their origin in the inner granular layer of the retina, and development had taken place outwards towards the choroid, whilst the innermost layers of the retina remained almost wholly unaffected. Though he would not deny the fact, he would certainly not hazard the tempting conclusion that glioma can only increase towards the exterior. He believes, on the contrary, that there is a form of the disease which, developing at the expense of the innermost

layers of the retina, projects towards the vitreous ("Annales d'Oculistique," Mai—Juin, 1870, p. 288).

CATARRH OF THE LACRYMAL SAC; ECTROPION AND LOSS OF EYELASHES. STILLING'S OPERATION. CURE.

Dr. Terson, of Toulouse, has communicated to Dr. Warlomont the account of a case in which he had successfully performed Stilling's operation. The patient had suffered from disease of the sac for 13 years with ectropion and loss of eyelashes from both eyelids. After the operation, and without any other remedies being used, the ectropion disappeared and the eyelashes grew again. At the end of eight months there only remained a slight overflow of tears, due to obliteration of the lower canaliculus, of old standing.—"Annales d'Oculistique," January—February, 1870, p. 85.

ADVISABILITY OF OPERATING IN CASES OF CANCER OF THE RETINA.

Fano ("Union Medicale," January 15, 1870, p. 70) thinks that extirpation of the eyeball is the rational treatment in the early stage. To abandon the patient to the natural course of the disease is to devote him to certain death. The cases of return after extirpation are not so frequent as generally stated, and those who have experienced a rapid return of the disease have perhaps operated at a stage when, the optic nerve being already invaded by the disease, it was difficult to remove all the affected parts. Dr. Warlomont remarks that he entirely coincides with this view. In cases of recurrence where this might have been prognosticated from the family history, the operation has at least had the effect of sparing the patient the violent agony to which he is exposed the moment the eyeball becomes increased in tension, a consequence which must follow, and which terminates in the giving way of the sclerotic, when this yields to the increasing development of the tumour. Moreover, were there only one case of success met with, here and there, one would be still authorised in seeking for it at the price of many reverses. Our author has done us the service of publishing two cases attended with successful results, calculated to encourage us.—"Annales d'Oculistique," January—February, 1870, p. 84.

LODGMET OF A FOREIGN BODY WITHIN THE EYE FOR 43 YEARS.

Terson ("Revue Medicale," de Toulouse, January, 1870, p. 12) records a case in which a fragment of iron, of the size of half a grain of wheat, had been encysted by the side of a displaced lens for the extraordinary period of nearly 43 years, which had inter-

vened between the time of the accident and that at which an operation was rendered necessary.—“*Annales d'Oculistique*,” January—February, 1870, p. 85.

PALPEBRAL GRANULATIONS.

Dr. Hairion writes on this subject (“*Annales d'Oculistique*,” January—February, 1870, pp. 5—39). After showing how diverse are the opinions held on the matter by authorities generally, the author passes to discuss the question of the prevalence of granular ophthalmia in the armies of European nations and among the civil population, deducing some interesting statistics, and then treats of the anatomy of the conjunctiva. He specifies three kinds of glands. 1. The conglomerate (Krause) are situated in the mucous tissue on a level with the attached border of the eyelid and at the outer half only; there are from 12—18 in the upper cul de sac and from 2—6 in the inferior; they appear to be derived only from the lacrymal gland, and secrete tears; they are visible to the naked eye on prepared pieces of eyelid.* 2. The lymphatic or closed follicles (Krause and Henle) occupy, exclusively, the internal half of the cul de sac; they are small cavities, surrounded by fibres of connective-tissue and crossed by trabeculæ, which support the capillary blood-vessels; between these trabeculæ are spaces containing the elements of lymph. These follicles closely resemble the intestinal glands. Van Kempen states that they are frequently absent in man but constant in some other animals. 3. The muciporous crypts (Manz) are situated around the cornea; they are oval or roundish follicles, provided with an opening having an oval thickened margin; they are enveloped by connective-tissue fibres, and contain cells and fine granules. Stress is laid on the situation of the glands as showing that the granulations cannot be affections of these. Granulations are divided into the papillary and the vesicular. The author enters at length into the consideration of these. We give a table he has drawn up contrasting the two.

Papillary Granulations.

1. Papillæ engorged, or hypertrophied by inflammation; an engorgement, a simple hypertrophy or hyperplasm.

Vesicular Granulations.

1. Formed by the production of small sacs containing plastic matter, and simple, rounded globules; a neoplasm.

* After maceration in a strong solution of tartaric acid for twenty-four hours the conjunctiva becomes transparent and the glands are seen as opaque, white granules.

Papillary Granulations.

2. They are situated on the tarsal part of the palpebral conjunctiva, beyond which they rarely pass.

3. Sometimes they are seen in the form of small, mamillated, uniform eminences, of a pale red colour, isolated from one another, and with some resemblance to shagreen, sometimes as small masses of a bright red colour, fungoid and fleshy, separated, from one another by deep fissures, and presenting sufficiently well the appearance of the fleshy granulations of suppurating surfaces.

4. The mucous membrane is red, inflamed, thickened, as from hypertrophy, and there is a muco-purulent discharge, heat, photophobia, and lachrymation.

5. When the papillary granulations are complicated with affection of the cornea, it is in the form of ulceration and softening.

6. In the papillary hypertrophy, the eyelids are thickened, and appear enlarged; hence drooping of the upper eyelid ensues, and eversion of the lower one.

7. Always the result of inflammatory mischief. The papillary granulations are not capable of direct transmission, but the ophthalmia from which they result, when it is accompanied by a purulent secretion, can propagate itself by direct contagion.

He gives the following contrast between ordinary catarrhal ophthalmia and the army, or Egyptian ophthalmia:—

Catarrhal Ophthalmia.

1. It is brought about by causes purely accidental; such as irritation of foreign bodies, fatigue, privations, &c., or sporadic or endemic catarrhal influences.

2. It may spread epidemically.

Vesicular Granulations.

2. They are situated on the surface and in the thickness of the stroma of the palpebral conjunctiva; three times out of four almost one finds them on the ocular conjunctiva at the same time, and sometimes in the tissue of the cornea proper.

3. They are characterised at first by small, crystalline, pearly prominences, having the appearance of small, transparent, hyaline vesicles.

4. The conjunctiva, at first, preserves its physiological characters; there is neither redness, nor heat, nor epiphora, nor any defect of sight.

5. If vesicular granulations attack the cornea, trachomatous pannus is developed.

6. In the last stage, the granulo-vesicular affection induces atrophy of the conjunctiva, deformity of the tarsal cartilage, and inversion of the eyelids.

7. Vesicular granulations are transmitted by miasmatic agencies, without the conjunctiva being apparently the seat of any morbid secretion.

Military Ophthalmia.

1. There is only one recognisable cause; a contagious and specific principle.

2. It never spreads epidemically; its character is endemic.

Catarrhal Ophthalmia.

3. It is propagated by direct contagion only; that is to say, by the transport of the products of secretion from the conjunctiva of an affected person to a healthy conjunctiva.

4. It is characterised by acute inflammation of the oculo-palpebral conjunctiva, accompanied by lachrymation, smarting, photophobia, &c.

5. If granulations form, they are limited to the tarsal part of the palpebral conjunctiva, and are consecutive to the inflammation.

6. It is essentially acute and rarely becomes chronic.

7. It is more common in winter and spring.

8. It yields readily to appropriate treatment.

9. Once cured, there is no tendency to a return without a renewal of the exciting cause.

10. It runs a regular course, ordinarily a rapid one.

11. It does not leave any alteration in the conjunctiva.

Military Ophthalmia.

3. The principal, if not the only, mode of contagion is miasmatic.

4. Its characteristic is the development, in the stroma of the conjunctiva, of vesicular (neoplastic) granulations, wholly distinctive, not accompanied by any subjective symptom, as they develop unknown to the patient, who is unaware of his condition.

5. The granulations commence in the retro-tarsal fold of the conjunctiva, and spread to the oculo-palpebral portion, and to the cornea. They precede the inflammation of the conjunctiva, and result from a mild and insidious irritation.

6. It is essentially chronic; it only accidentally becomes acute.

7. Its intensity is diminished in winter, but returns with increased severity in the heat of summer.

8. It is very obstinate, not yielding to the usual treatment for ophthalmia, requiring the use of particular remedies, and showing very great intractability.

9. There is a remarkable tendency to return, even after a long interval, without the intervention even of the exciting cause among individuals who have once suffered.

10. Its course is irregular, of long duration, and with periods of greatly increased severity.

11. It leaves nearly always profound and indelible traces in the conjunctiva.

ANÆSTHESIA OF THE RETINA.

Dr. A. Sichel, junr., writes on this subject in the "Annales d'Oculistique," Mai et Juin, 1870. He understands by this term a failure of the power of transmitting sensations to the brain, with a want of susceptibility of the retina itself. The retina perceives the impression, but the patient remains unconscious of it. The attack generally comes on suddenly, follows some severe moral impression, and occurs in those who have a sensitive nervous organisation. Some few days generally elapse after a fright or loss of consciousness before the failure of sight ensues. There are no objective symptoms of the affection; the ophthalmoscope reveals no changes; a sensation of light is produced by pressure on the eyeball in any position, and the pupils are normal. The field of vision alone furnishes us with valuable information; generally there is either concentric limitation or scotomas or manifold variations. The patient may complain of any degree of loss of sight from simple amblyopia to complete amaurosis. Often the acuity of vision is only reduced to one-half or one-third of the normal standard. It is not diminished by artificial light, but is often increased by the employment of coloured glasses. Various "hysterical" symptoms are often present. The duration is uncertain and the severity of the malady is subject to variations at different times, but its course is usually benign and ends in all cases in a cure. The treatment should be of a general character. Two cases are narrated, the first is given in great detail, and was that of a man 28 years of age, whose history extended over a period of 12 years. At the commencement he was seized with loss of sight of the right eye, which came on in the course of a few days and lasted about a year. Four years later a similar attack occurred. He consulted M. Sichel, the elder, who ordered tonic remedies. The patient recovered at the end of about eight months. Seventeen days before he finally came under care the patient had been seized with a sunstroke while forming one of a picnic party. The next day he suffered from loss of consciousness for two hours, accompanied by vomiting and purging. Five days later he was seized with intense pain in the head, immediately followed by progressive failure of sight of the right eye. At the time of examination the vision of the right eye was completely lost. The chief point of interest was the variation in the extent of the field of vision of the left eye, of which numerous charts are given. At times there was an inability to distinguish certain colours. Von Græfe, being in Paris, was consulted, and M. Sichel told him he suspected that the amaurosis was simulated. The diagnosis of retinal anæsthesia was confirmed and treatment by oxide of zinc recommended (four grains divided into 200 pills, one to be taken thrice daily, and the dose increased, by one pill

every two days, to four pills three times a day). Gradual recovery followed. The sight of the right eye returned and the field of the left became normal. M. Sichel sums up the case, and remarks that it would be difficult to find a more perfect type of hysteria, and he thinks that the diagnosis of retinal anæsthesia or of hysterical amaurosis is indisputable.

The second case was very similar to the first, but the patient was a woman aged 26. The symptoms had lasted about three weeks. She had had a similar attack at the age of eight or nine years. She had a second one at the age of 15 or 16. Various methods of treatment were tried for the relief of the attack for which she came under care, but no good result followed till the oxide of zinc was employed. She then steadily improved. At the end of three months she returned home able to resume her occupation, that of a seamstress. She was of a highly nervous temperament, and presented symptoms of an essentially hysterical character. This case was analogous to the preceding, from the fact that the defect of sight was accompanied by hysteria; that there was an entire absence of any change in the fundus oculi; that phosphenes could be produced; that the result of objective examination was negative; and that vision returned under the influence of anti-chlorotic and anti-hysterical remedies.

PRIMARY CARIES OF THE ORBIT.

In the "*Annales d'Oculistique*" (Juillet-Août, 1870, p. 7), is a communication from Dr. Jules Sichel, in a series of more or less detached observations, on caries of the orbit. It is said to be of two kinds: primary, arising from inflammation of the bone itself; and secondary, from the pressure of tumours on the bone, or from other indirect causes. The author lays stress on the kind of tumour which, in his opinion, attends the onset of orbital caries. This swelling has hitherto escaped detailed description by authors. It is produced by a detachment of the periosteum, which is lifted up sometimes by a fluid secreted wholly by itself, and by the subjacent inflamed bone, and sometimes (and more frequently) by the products of suppuration of the bone caries. It happens, however, occasionally, in a very early stage, that the periosteum is elevated by a simple exudation on its inner surface, it is even probable that sometimes the mere thickening of the membrane accompanying the inflammation preceding the detachment, is the earliest stage of the swelling. If a case of caries be met with before any incision has been made, or before the integuments have given way, a tumour of a peculiar kind will always be present. At any rate the author has never failed to observe it. Now and then a case may be seen when the only symptoms are a dull pain, augmented by pressure

at some part of the orbital margin, some headache and slight dizziness. The inflammation may terminate in resolution, but more frequently passes on to caries, the pain then becoming more violent, and only ceasing after a certain time. Sometimes, however, it may not be increased, but disappears completely. Sooner or later one of the eyelids, generally the upper one, swells, becomes tender, and slightly reddened at one part. There is but little tenderness to the touch, and gradually at the part of the lid affected a circumscribed tumour appears, nearly always extremely tense, hard, inelastic, and analogous to that of periostitis. There is no chemosis, excepting when the swelling has given way, so as to allow of the pus escaping between the periosteum and the soft parts within the orbit; or when the cellular tissue of the orbit and the eyeball are much involved, and when the latter is pushed forwards. After the swelling has burst or been opened, the progress is always very slow, on account of the great thickening of the periosteum.

Exfoliation of the bone and cure of the caries are not much expedited by the local remedies whose effects are so much vaunted. Light cauterisation of the bone with nitrate of silver has often given advantageous results, but the author depends on constitutional rather than on local remedies.

When sinuses have formed the disease is of course easily recognised. Not unfrequently other symptoms are present, such as strabismus, diplopia, diminished mobility of the globe, exophthalmos, or a more or less evident defect of sight.

If the tumour arrives at its maximum development (the periosteum not having given way or been incised), it becomes nearly as hard as ivory, and exceedingly painful, its surface glossy, and of a deep red or purple colour. It is generally immovable, and firmly adherent to the wall of the orbit; exceptionally it appears slightly movable at its summit. In one instance only a very small tumour, elongated, as if pedunculated, was also movable at its base. Generally no fluctuation can be detected till a late stage, and the tumour has attained the size of a large walnut.

The author has more frequently met with the disease at the upper part than in the floor of the orbit. Even after the swelling has been incised, pus is liable to gravitate and collect anew deeper in the orbit, and may show itself, either behind the upper or lower eyelid. The difficulty of keeping the abscess cavities empty has given rise to various plans of compression, and M. Ribéri invented an instrument for this purpose, but no very satisfactory results have been obtained from any of the plans.

In the following number (pp. 93—131) the treatment of primary caries is discussed and illustrated by cases. The author then passes on to consider secondary caries and its treatment, and caries in the neighbourhood of the lachrymal organs. The paper is not adapted for reproduction here.

MEANS OF PROVING AMBLYOPIA, OR AMAUROSIS OF ONE EYE ONLY.

In the "Annales d'Oculistique" (Juillet-Août, 1870), is a note of a communication by Cuignet (Rec. de Mém. de. Méd. Chir. et Pharm. Milit. 1870, Avril, p. 320), on the means of establishing a diagnosis of monocular amblyopia or amaurosis. The author cites three. The first depends on the existence of the "blind spot." This can only be seen when one eye is shut. The test is obvious. The second consists in passing a lighted candle before the eyes from right to left (or *vice versâ*) in a darkened room. If the right eye, for example, be blind, the light, carried from right to left on a level with the eyes, can only be perceived when it has passed the bridge of the nose and affects the left eye. The third, on which the author places most dependence, and which is really of great simplicity, depends on the fact noticed by M. Javal, that when an elongated object (a pencil, for instance) is interposed between the eyes and a page of printed or written characters, this interposed object does not conceal any part of the page if the patient have binocular vision. If, on the contrary, he only sees with one eye, some of the characters are absolutely hid, just as if the pencil were actually applied to the eye. This means of proving defect is of the simplest kind, and yet the shrewdest are caught by it. Dr. Warlomont adds a yet more simple expedient, which requires no apparatus whatever, and which in a medico-legal investigation was perfectly satisfactory. If, whilst looking at an object with both eyes, a finger is placed on one of them (and thus its optic axis is displaced), the object will appear double. The eye which one has not touched continues to see the object in its real position, the other sees it below or above, to the right or to the left, according to the direction of the pressure. Show to the patient under observation two dots marked on paper, after having thus displaced the axis of one eye. If he declares that he sees four dots, it is manifest that he sees with both eyes. It is ridiculously simple.

CYST OF ONE OF THE EXCRETORY DUCTS OF THE LACHRYMAL GLAND.

M. Dubrueil relates the following case ("Gaz. des Hôp.," 1870, No. 92, p. 365). Eliza R., a domestic servant, æt. 35, applied on May 11th at the Beaujon Hospital, on account of a swelling at the upper and outer part of one eye. On examination, a nearly spherical tumour was found above the outer canthus, of the size of a large hazel nut, situated between the eyeball and the eyelid, covered by the conjunctiva, slightly reddened in its lower half, which projected underneath the free border of the upper eyelid when this was raised. When the eyelids were closed it was concealed under the upper one, which stood out in

manifest relief. This tumour had developed without apparent cause some twelve months previously. It was fluctuating, transparent, indolent, and, according to the patient's statement, it enlarged noticeably whenever she cried. The tears flowed, however, in normal quantity on the surface of the globe, the movements of which were somewhat interfered with. Vision was unaffected, the general health good, and there was little more than the deformity caused by the cyst to make the patient anxious to get rid of it.

On the 12th May, whilst the upper eyelid was raised, an incision was made with a cataract knife in the direction of the palpebral fissure, over the tumour, and quite superficially. A very thin membrane was then dissected off for some distance. It consisted of the fold of the cul de sac displaced by the tumour. Beneath, there remained a membrane still more attenuated, a pellicle, which was at last ruptured, giving exit to about a small spoonful of serous fluid, which was set apart for analysis, but was unfortunately upset. The anterior portion of the cyst was then cut away with scissors; afterwards a bandage and compress were applied. The next day there was slight swelling, on a level with the remaining portion, but this soon disappeared, and the patient rapidly became perfectly cured, the only treatment adopted being to cauterise two or three times the part of the cyst left behind.

Was this a case of cyst of the conjunctiva, rarely seen, but to which attention has been called by Sichel? or, was it really a case of cyst developed in one of the excretory ducts of the lacrymal gland? In favour of the latter view is the patient's statement that the swelling increased when she cried, and also the situation in which it was developed. The operation did not reveal anything. The examination of the fluid would have been a great help, but it was lost. A microscopic examination, in conjunction with Dr. Legros, definitely established the undoubted nature of the cyst, showing that its internal surface was lined with cylindrical epithelium, identical with that of the excretory ducts of the lacrymal gland. To sum up, the lacrymal fluid had collected in one of the excretory ducts, obliterated at its terminal or conjunctival extremity, and communicating still with the gland, as was proved by increase of size during lacrymation.—(*"Annales d'Oculistique,"* Juillet-Août, 1870, p. 75).

ASCENDING GLIOMA OF THE RETINA, FOLLOWED BY DEATH.

The following case occurred under the care of Professor G. Arcoleo, of Palermo. The patient was a boy, æt. 3 years, who came under care in October, 1867. The right pupil was extremely dilated, and the eyeball was increased in size. The fundus could be seen to be occupied by a gliomatous tumour of

the retina, and had the shining reflex often noted in this class of cases (like that of a cat's eye). The presence of the tumour had been demonstrated by a practitioner five months before, the other symptoms having been noticed by the parents since the month of January. Vision had from the first been defective, and had rapidly been lost entirely. The parents refused the only available treatment, that of enucleation. Finally, however, consent was obtained; as much of the optic nerve as possible was removed. It was already affected by the disease. The examination of the eye, hardened in the usual manner, and cut transversely, revealed the following:—The crystalline was fatty and rich in crystals of cholesterine; the vitreous was nearly destroyed, only connective-tissue remaining; the choroid and iris were atrophied; the retina transformed into a considerable mass of small cells and highly refracting nuclei, arising from the inner and outer granular layers, and mixed with a limited number of connective-tissue fibres; the optic nerve was crammed with neoplastic deposits, its nerve-fibres in part destroyed, in part in course of degeneration; the sclerotic was normal, the cornea dull. Fifteen days had hardly elapsed before there was evidence of a growth about the optic foramen. This was removed and the parts freely cauterised. A slight check was followed by more rapid increase of the growth, and the cavity was soon filled anew by the morbid proliferation. The child's health rapidly failed, the glands in the groin began to enlarge, and sub-cutaneous lumps appeared in two places on the head. It was evident that, besides passing to the brain, along the optic nerve, the gliomatous growth was affecting the whole system. One remarkable circumstance consisted in the fact that the vision of the other eye, tested daily with care, remained intact till the last. The child died February 27th, one year after the onset of the disease.

Autopsy. After the scalp was removed, some fleshy tumours were seen on the epicranial aponeurosis, the most marked being situated over the superior occipital angle. These tumours corresponded to depressions, or excavations, of the inner surface of the calvaria, which at these places was much thinned, by caries and necrosis, and covered by ecchymosed and softened dura-mater. At the base of the brain, and exactly above the optic commissure, was a soft, gelatinous, reddish tumour; the structure of the left* optic nerve was disorganised from the stump to the optic tracts. The thalamus opticus, of the same side, and the third ventricle, were involved in the degenerative process. The right optic nerve had retained its normal aspect, but was slightly soft to the touch. The mass of the tumour (in the chiasma) was very soft and irregular, and did not present any trace of an external, limiting membrane. The chiasm itself was infiltrated,

* Right and left have been confused.

for two-thirds of its extent, by new growth, having the structure of a glioma properly so called, but as the disorganised left optic nerve was approached, the growth acquired the characters of a medullary glio-sarcoma, of which the cell elements, with many large nuclei, formed considerable collections. Deep incisions into the chiasma revealed the same phases of transition between a glioma and a glio-sarcoma. It was in the orbit that the greatest quantity of the glio-sarcomatous substance was collected. The same growth had invaded the sheath of the right optic nerve; the medullary substance had in great part undergone fatty degeneration.

In the continuance of visual power in the right eye in this case, the author sees fresh confirmation of the idea he expressed at the Paris Ophthalmological Congress in 1867, that there is no general or partial intermingling of the optic nerve-fibres corresponding to the chiasma, but a simple juxta-position, which does not interfere with the transmission of sensations by each eye separately.

A pathological problem suggested by the case concerns (1) the origin of retinal glioma; (2) its conversion into a glio-sarcoma; and (3) its diffusibility. (1) The author does not admit that glioma can originate in the anterior limiting membrane. He is of opinion that the point of origin is in the granular layer, but he cannot say whether in the outer or inner one. In this case both were equally involved. (2) Virchow has foreseen the possibility of the transformation of a glioma into a mixed form, but without wishing to pronounce categorically on the point. This mode of regarding glioma receives abundant confirmation in the present case by the insensible transition along the optic nerve, and more especially in the chiasma of a glioma into a glio-sarcoma. Instead of being an exceptional occurrence, one would expect this conversion to be common on account of the special structure of the optic nerve, which predisposes to the development of a sarcomatous character. So far, however, it is only an hypothesis, which more attentive study of tumours having their seat in the nerve can alone establish or destroy. (3) Besides the present case observed by the author, there have been others noted, more especially one by M. Knapp (of Heidelberg), which do not permit of any doubt being felt as to the diffusibility of glioma. There only remains to be ascertained whether we must believe, with Vichow, that there are two kinds, a benign and a malignant or infecting glioma. If this were the case, there ought to be well-marked distinctions between them; really, all gliomata can be reduced to one and the same type. There are three modes by which a glioma may be diffused; directly, to contiguous, homologous structures (or rarely to those of a different nature); indirectly, by the formation of secondary neoplastic centres in the neighbourhood of the first; and by metastasis, the

development of secondary or tertiary tumours in the lymphatic glands, lungs, liver, or kidneys.

In its physiological aspect, the case gives rise to the question whether alterations in the texture of the optic nerve are compatible with the persistence of the visual function. The child, not long before death, could see a small pin held in the author's fingers, and took it in its own; could see his parents, &c., and yet changes were found in the optic nerve. The author considers that the medullary substance is destined for the nutrition of the nerve-fibres; that it is an unimportant element, and is interposed for their isolation and mutual independence in the exercise of their functions, and to preserve their individual integrity. Valentin and other observers have shown that the medullary substance may have undergone serious alterations, or may be quite destroyed, and yet impressions may be conveyed to the brain so long as the continuity of the nerve-fibres remains intact. So that in the case of this boy, the changes met with in the medullary substance did not signify, so long as the retina could receive, and the nerve fibres convey, impressions. ("Annales D'Oculistique," Juillet-Aout, 1870, p. 77).

EPITHELIAL TUMOUR OF THE EYEBALL.

("Ann. d'Oculistique," September-October, 1870, p. 132) Dr. Lebrun communicates the following case. We have abridged the account. The patient was a man aged 63, a weaver, who presented himself at the Ophthalmic Institute of Brabant on account of a tumour which had existed some nine or ten months. The first symptoms were slight irritation and redness in the corner of the right eye. At the end of seven or eight weeks, a small tumour was noticed towards the outer angle quite outside the cornea. The growth had steadily increased in size till it had acquired that of half a hazel-nut, forming a square, whose side equalled four and a half lines. It invaded the upper and outer two-fifths of the cornea, and encroached on the sclerotic still more; it had a fleshy appearance due to a rich vascularity from enlargement of the ciliary veins, which were well-marked and tortuous in the neighbourhood; it seemed to be made up of three lobes, of which the two smaller ones, of the size of lentils, covered the cornea, and the third, flatter, but larger than the other two combined, was lost under the vascular and thickened conjunctiva in the outer angle. The upper corneal lobe, as well as the upper border of the sclerotic lobe were highly pigmented, giving to these portions a very deep colour. This same tint was also noticed at two or three spots in the ciliary region of the outer half of the sclerotic. The pigmentation had even invaded slightly the upper part of the cornea apart from the tumour, but without producing any noticeable elevation. The iris preserved its

normal colour, position, and mobility. The only affection of the sight was a slight diminution of the field at the outer side, where the tumour encroached on it slightly. The cornea remaining perfectly transparent even up to the very border of the tumour, led to the supposition that the epithelial layer alone was, or had originally been affected. The patient was a robust countryman. He had had no pain in the eye, there was no enlargement of glands, nor any history of cancer in his family. The rapid progress and infiltrating character of the growth left no room for hesitation as to the propriety of entire removal, and even of the eyeball, if necessary. The patient consented, and fortunately it was found that the growth could everywhere be dissected off. The greatest care was exercised to remove all the pigmented parts, both conjunctival and corneal. Finally, the additional precaution was taken, by M. Warlomont, of cauterising the surface with nitrate of silver. Microscopic examination showed, both on the surface and in the substance of a web of richly vascular connective-tissue, a multitude of large, epithelial cells, of which a large number were infiltrated with pigmentary granules; some had even lost all transparency, owing to the infiltration of pigment. Free granules of pigment were found in more or less abundance floating in the juice, and in less quantity in the tumour. The pigmented conjunctival spots showed no changes in the epithelium, save the presence of the granules of pigment. Considerable suppurative inflammation followed the operation, and some hypopyon was present, but these symptoms subsided, and at the end of three weeks the cicatrisation of the sclerotic was complete, but a large ulcer of the cornea remained. A suspicious "button" appeared at one edge of this ulcer, and was cauterised.

When the patient went out, the cornea in its outer two-fifths was vascular and partly cicatrised, the conjunctiva was very vascular; the iris was slightly discoloured, but the pupil was not adherent, though not very susceptible of regular dilatation; a fair amount of sight, sufficient even, according to the patient, for working.

In the course of the year he came to the "Clinique" many times, and the cure seemed radical and definitive.

DERMOID TUMOUR OF THE EYEBALL.

(Communicated by Dr. Lebrun to the "*Ann. d'Oculistique*," Sept.-Oct., 1870, p. 135.)

A boy, aged seven, was brought on account of a small tumour of the left eyeball, which had existed since his birth. It was of the size of a pea, non-pedunculated, of a yellowish-red colour, situated at the sclero-corneal junction a little below and to the outer side. It was regular in form and of the consistence of a

lipoma. No hair could be discovered on its surface. One interesting fact was the presence, at the same level, a little above the tragus, and in front of the ear, of another dermoid tumour of slightly smaller size, and covered with fine hairs. The tumour of the eyeball did not increase in size apparently, but caused some constraint in the movements of the globe, and it gave rise to slight irritation of the eyelids. Moreover, it was a deformity. Removal was effected by taking hold of it with forceps and dissecting with a scalpel, the surface being afterwards cauterised. On examination, the tumour appeared to consist of fibro-cellular tissue without fat or glands, resembling the structure of the cornea and sclerotic. Nitrate of silver was applied to the granulating surface several times, and finally only a small whitish cicatrix remained on the cornea like that of a leucoma.

APPLICATION OF A LEECH TO THE EYE; CHRONIC CONSECUTIVE INFLAMMATION; SHRINKING OF THE GLOBE; SYMPATHETIC OPHTHALMITIS OF THE OTHER EYE; EXTIRPATION OF THE LOST EYE; IMPROVEMENT.

(Communicated to the "*Ann. d'Oculistique*," Sept.—Oct., 1870, p. 136, by Dr. Lebrun.)

A man, aged 39, a domestic servant, applied on account of severe inflammation of the right eye. At the lower and outer margin of the cornea a triangular wound, unmistakeably a leech-bite, was detected; the pupil was displaced as after an iridodesis, and there was a considerable hypopyon which filled the lower part of the anterior chamber. The patient said that after suffering from irritation of the eye for some time, and after a practitioner had tried various remedies without effect, a leech was ordered to be applied to the inflamed part. The leech took hold far forwards and pierced the eyeball. What followed exactly can only be conjectured, but the border of the iris, corresponding to the bite, had disappeared and the pupil was displaced as if after an iridodesis, excepting that the iris and the deeper-seated membranes were strongly inflamed; the lens was not affected; the globe seemed somewhat softened. Although there had been no fistula, and in spite of treatment, a low form of inflammation of the deeper membranes persisted, the pupil became completely closed, and the globe was evidently wasting. In this condition he left the hospital, but was warned to return at once if the other eye became affected. In two months he came with the left eye so much affected that he could but just manage to do his work. He had in the mean time had many attacks of inflammation in one or other eye, but had been unable to show himself. The right eye was then greatly wasted and much congested. The left eye could scarcely bear exposure to light, watered considerably, and

was often painful. The cornea was perfectly transparent, the iris was not discoloured, was still mobile, but dilated with difficulty and irregularly; there was ciliary congestion, and the eye was too irritable to admit of ophthalmoscopic examination. The right globe was removed. Afterwards the sympathetic irritation of the left began to diminish, and finally disappeared, but, according to the patient, the amount of sight remained the same.

FOREIGN BODY IN THE IRIS.

(*Dr. Lebrun, "Annales d'Oculistique," Sept.—Oct., 1870, p. 137.*)

A locksmith, while cutting a key with a chisel, was struck a violent blow on his right eye by a piece of iron. Three days later he came under the care of Dr. Warlomont, who recognised a foreign body, encysted in or on the iris, within the anterior chamber, at the lower and inner part. There was some hypopyon. An incision was made in the cornea and the foreign body removed. This could not be effected, however, without removing a portion of iris. The foreign body was about a line in length and half a line in width, and was embedded in the substance of the iris without having ruptured the lens capsule. The patient entirely recovered, and said that he could detect no difference in his sight.

TRAUMATIC DIVISION OF THE RIGHT INTERNAL RECTUS; DIVERGENT STRABISMUS; OPERATION FIVE YEARS LATER, STITCHING THE MUSCLE FORWARDS; RECOVERY.

(*Dr. Lebrun, "Annal. d'Oculistique," Sept.—Oct., 1870, p. 139.*)

The patient was a woman aged 40. The eye diverged so much that when it was in a state of rest the outer border of the pupil was hid under the outer canthus. The external rectus was first of all divided, and then, some days later, an incision was made following the normal points of attachment of the internal rectus, and the conjunctiva dissected as far as the inner canthus, and then, the wound being held open, the capsule or the muscle itself was seized with forceps, far back. It was then detached from its recent points of attachment and brought forwards into its natural position, or even still more forwards, being retained by two points of suture. Notwithstanding the long time that had elapsed, the muscle had not lost its contractile power, but at the end of a few days seemed to act as well as the other. It is worthy of remark that the vision had never been affected, nor was there diplopia, owing undoubtedly to the extreme squint. No double vision occurred after the operation.

THE CO-EXISTENCE OF ANEURISMAL CHANGES IN THE RETINA, WITH ANEURISMS OF THE SMALL ARTERIES OF THE ENCEPHALON.

H. Lionville communicates a note on this subject to the "*Gaz. des Hôp.*," 1870, No. 36, p. 151, given in full in the "*Ann. d'Oculistique*," September-October, 1870, p. 169. We select the following points:—

The author has previously shown the co-existence of small (miliary) aneurisms of the small arteries of the various parts of the body with miliary aneurisms of the small cerebral vessels (aneurismal diathesis) and he argued then, that if aneurismal changes in the vessels were dependent on an alteration in the whole arterial system, rather than on a local lesion in this or that part of the body, these aneurisms, developed in connection with a general change, might be met with in some parts accessible to our investigation, such as the retina. The retina seemed to him, in fact, to be one of the organs which it would be easy and important to investigate for the detection of this general condition, and he expressed a hope that either during life or after death its examination would reveal important information. The object of the present note is to show that such information has been obtained.

In 1868 the author communicated the results of his investigations to the Biological Society.

The first case was that of a woman, aged 87, who had had (two years before) a sudden attack of right hemiplegia, without loss of consciousness; afterwards she suffered from dizziness, flushing of the face, and headache, and she died August 15, 1868.

The blood-vessels were found in places to be very atheromatous; there were well-defined aneurismal dilatations on the meninges, and numerous miliary aneurisms on the surface and in the interior of the brain, in the cerebellum, and the pons varolii. Examination of the right eye showed the retinal vessels to be very much dilated, gorged with blood, and tortuous; and in their course were found rounded dilatations, separate, and resembling aneurisms completely, which they were at once suspected to be, but this could only be proved on examination with a lens. The crystalline lens was opaque, otherwise, the author remarked then, these lesions might have been demonstrated by ophthalmoscopic examination.

In the following year MM. Bouchereau and Magnau showed some specimens to the Society, from a remarkable example of general aneurismal changes. The patient was a man aged 58, who drank excessively, was subject to epileptic fits, and died in one. At the autopsy there were found cerebral hæmorrhages, cerebral aneurismal dilatations, retinal hæmorrhages and miliary aneurisms and spinal meningitis.

A third case the author saw in conjunction with M. Charcot. The patient was 72 years of age, and had died after slight apoplectic attacks. The autopsy revealed innumerable miliary aneurisms, scattered throughout the brain, cerebellum, pons varolii, and the membranes. They were of all sizes, of different ages, and in many places corresponded with multiple, localised apoplexies, also of different ages. There were extensive arterial changes in various parts of the body, but also aneurisms were found in both retinae. These aneurisms corresponded to small apoplexies infiltrated into the retina itself. Briefly, there were disseminated here and there, small zones of ecchymosis, of a rusty-yellow colour, surrounding rounded dilatations of the vessels, which could be made out very fairly with the naked eye, and could be distinctly demonstrated with a lens. Moreover, microscopic examination discovered others, which on simple inspection had not been recognised. Some required to be magnified 10 or 20 diameters before they could be recognised, whilst others were as large as a small pin's head, or as a tobacco seed, and one had attained the size of a small millet seed. In this case the lenses were clear, and an ophthalmoscopic examination might have been made.

ASTHENOPIA FROM SPASM OF THE MUSCLES OF ACCOMMODATION.

Fano records the following ("Gaz. des Hôp," 1870, No. 56, p. 222):—

M. T., a mechanic, æt. 27, came under care on the 1st of December, 1869. He complained of inability to see when he tried to read; after having read about half a printed page, he only saw the print confusedly, the characters appearing to run into one another. In order to assure himself of the nature of the failure of sight, M. Fano gave him a page of ordinary print to read, making him hold the book on a level with his eyes. The patient read aloud, and it was agreed that as soon as his sight failed he should make a sign with his hand, without ceasing to fix his eyes on the page. This test showed manifestly, that, at the moment when his sight failed, when the printed characters ran into one another, on observing the patient's aspect, it was evident that, at that moment, the right eye turned towards the large angle of the orbit: that is to say, that a convergent strabismus was produced on that side. The same test, repeated after many days' interval, gave the same result. There could be no doubt, therefore, that the difficulty in seeing was the result of the deviation of the right eye inwards, depending on excessive action of the adductor muscle of this eye during binocular fixation. To remedy this condition, M. Fano proposed to the patient, who consented, that the right adductor should be divided. This

operation was performed on the 8th December. It was complete, that is to say, it comprised division of the whole thickness of the muscle.

After the operation, M. Fano ascertained that the patient preserved the power of directing the right eye inwards in as great a degree as before the myotomy. The latter was not followed by any untoward event.

On the 28th December, T. resumed his work, which he could execute easily. In the evening he began to read a few lines, but was obliged to desist.

On the 3rd January he announced that during the day he could read for three hours consecutively, without fatigue. In the evening fatigue was still as quickly experienced when reading, but even then the lines of print did not run into one another.

On March 7th T. showed himself at the "Clinique." The state of vision varied on different days; some days he could read for long, without being tired, and on others fatigue ensued rapidly. On causing him to read print aloud, and watching him the while, M. Fano ascertained that even when the sight became confused, the right eye no longer deviated. It was recognised, at the same time, that T. had become hypermetropic, for, instinctively, he placed the book at a distance of 18". He was recommended to use No. 60 convex glasses ("Annales d'Oculistique," September-October, 1870, p. 172).

THE OPTHALMOSCOPE IN THE TREATMENT OF EPILEPSY.

Dr. Reuben A. Vance writes upon this subject, in a pamphlet reprinted from the "N. Y. Med. Journ.," Feb. 1871. For the last two years he has been in the habit of mentally arranging his epileptic patients according to the intra-ocular appearances observable with the ophthalmoscope. Two well-marked groups can thus be formed; one group characterised by vascular fulness, the other by anæmia of the retina. It is well known that either hyperæmia or anæmia is competent to give rise to epileptic paroxysms, and the author thinks that bromide of potassium is of the greatest service in the former condition, and contra-indicated in the latter. He gives cases in which the ophthalmoscopic conditions were noted and the effect of the bromide observed. In all the cases of congestion a good effect was at once apparent upon the administration of the bromide, and in those cases in which the benefit was permanent, the circulation of the eye was brought into such a state as to indicate a natural condition of the cerebral circulation. Furthermore, as long as this natural condition was maintained, the fits did not recur, but when the drug was continued until an undue effect was produced, indicated by anæmia of the intra-ocular structures, the convulsions returned, generally with augmented violence. The effect of a series of con-

vulsions upon the intra-ocular circulation seemed to be to produce an increase in the size and tortuosity of the retinal veins. This might be supposed to indicate cerebral congestion, but, in one case, as the treatment progressed, anæmia, denoted by a diminution in the size of both arteries and veins, became more and more apparent, but upon the occurrence of several paroxysms, the veins assumed a dilated and tortuous appearance. The arteries, however, remained unusually small. The changed shape of the veins was clearly due to the commotion excited by the violence of an epileptic paroxysm. The author does not think that every case of epilepsy can be cured by attention to the state of the vessels, and treatment directed accordingly, but he is fully convinced that even the most unpromising case may be relieved and the patient's condition very much mitigated by systematic and careful attention.

TUMOUR OF THE BRAIN; CONGESTION PAPILLA.

Mr. Swanzy narrates a very interesting case in a pamphlet reprinted from the "Dublin Quart. Journ.," Feb. 1871.

The patient was a private in the Scots Fusilier Guards. On the 18th April previously he had fallen out of the ranks, faint, on a march, and was admitted into hospital. He was then in a heavy, listless state; complained of headache, giddiness, and much vomiting; his pupils were widely dilated. From this time, till Aug. 18th when the patient died, the general symptoms consisted in constant headache, frequent vomiting, great drowsiness and loss of memory, so that he often forgot having had his meals. If asked a question, it would be some moments before he would reply, and then his articulation was very slow but distinct. The bowels were very torpid, making the use of purgatives frequently necessary. His symptoms varied in intensity. At one time he was so far recovered as to be able to take a short walk in the barrack yard; but the next day he was obliged to return to bed. About a month or six weeks after his admission, Mr. Swanzy was asked (by Dr. Robinson) to see the patient. He found the pupils widely dilated, and in the left eye all power of perception of light was lost. In the right eye there was still a slight power of perception of light. The ophthalmoscope revealed that condition of the optic disc described by Von Graefe as congestion papilla. This led to the diagnosis of an increased intra-cranial pressure, dependent probably on the presence of a tumour within the cranium. The appearances much resembled those figured in Fig. 2, Table xi, of Liebreich's Atlas, and have been well represented (by Dr. Fitzgerald) in drawings taken during life. One accompanies the pamphlet. There was great tumefaction of the optic disc; the tumefaction was very prominent, but did not

extend far into the surrounding retina. The retinal veins were very much engorged and very tortuous in their course; they disappeared from view in some places at the edge of the tumefaction, where they were obliged, in order to reach the centre of the disc, to turn round the edge of the tumid part. This condition was produced by an increased intra-cranial pressure, the cavernous sinus was pressed upon, the return of blood through the ophthalmic vein was impeded, and the retinal veins became enormously congested. It was then not difficult to understand how, under these circumstances, a kind of venous strangulation occurred at the narrow and rigid optic entrance, through which the retinal veins have to pass out. A serous exudation occurred here, associated with the formation of cellular tissue, and hence the tumefaction. The autopsy fully confirmed the diagnosis. A tumour, as large as a moderate-sized apple, was found situated in the centre of the brain. It involved the convolution at either side of the longitudinal fissure in the middle and anterior lobes, extending laterally somewhat into each hemisphere, and reaching downwards as far as the corpus collosum, but not implicating it. The tumour was a sarcoma, with small, round cells, and in some places it had undergone fatty degeneration. The swelling of the optic disc could be well seen in the preparation of the posterior part of the eyeball. A woodcut of this is given. The pathological changes, in congestion papilla, do not extend up the optic nerve, but cease at the lamina cribrosa, thus differing essentially from the disease known as neuritis descendens, in which the morbid changes extend from the base of the skull along the nerve to the papilla.

RETINITIS PIGMENTOSA IN CONNECTION WITH INHERITED SYPHILIS.

The patient was a boy, aged $11\frac{1}{2}$, who came under Mr. Swanzy's (Dublin) care with imperfect vision of the right eye. There was external strabismus and nystagmus; the eyeball was somewhat smaller than the other. The iris was dull looking, its fibrillæ not being distinctly marked as in the normal eye. The pupil dilated well with atropine. The sight was much worse in the dusk of the evening. By good light the patient could read with this eye small words of No. 8 (Sn) at 6" and CC at 15', glasses making no improvement. The eccentric field of vision was unimpaired, for even with a very imperfect illumination he counted fingers in all directions. The left eye was slightly myopic, but its vision was nearly normal, and externally it appeared quite healthy. The ophthalmoscope revealed changes which have been admirably represented in an illustration published with the case by Dr. Fitzgerald. The disc was of a dirty grey colour, and its margin indistinctly defined. The veins were

normal, but the arteries were somewhat diminished. In the periphery of the retina were deposits of pigment in the form of numberless small dots and streaks. During six months that the case remained under observation, although these specks and streaks became more numerous and extended somewhat more towards the centre, yet they had no tendency to become confluent, or to form themselves into stellate or bone corpuscle shapes. They were not deposited along the course of the arteries; on the contrary, they appeared to avoid the vessels, and to occupy, by preference, the spaces lying between them. At one place only were there specks which lay over a vessel. On the apparent inner side of the disc were patches from which the choroidal epithelium had been removed, and at the periphery the atrophy had probably gone deeper. In the left eye there were also choroidal changes, but no retinal pigmentation had occurred.

The patient was of a sallow, earthy complexion; one upper incisor was very characteristically notched. When a fortnight old, he had suffered from ulcerations about the anus, &c. The family history was confirmatory of the diagnosis of inherited syphilis. The parents were not related. With the exception of one case of which Mr. Hutchinson has given an account ("Ophth. Hosp. Rep.," vol. v, p. 324), and which is reproduced, Mr. Swanzy has been unable to meet with any details of similar affections. He publishes a letter from Mr. Hutchinson, confirming the diagnosis in the present case, and in which it is stated that the writer had seen several others more marked than the one he had published, and the diagnostic points are thus given:—"The rapidity with which the changes advance, and the early age at which the blindness is brought about. The changes are seldom symmetrical, or, at any rate, the two eyes rarely suffer in like degree. The pigment is often in blots or round specks as well as in lines and stars. There is often evidence of disease of the choroid as well. The pigment is more often irregular in its arrangement than in the more characteristic cases not due to syphilis. Still I have no doubt that inherited syphilis is not unfrequently the cause of affections which are spoken of as retinitis pigmentosa." Mr. Swanzy points out the symptoms which differentiated his case from an ordinary retinitis pigmentosa, as the shape of the deposits, their localisation apart from vessels and the absence of concentric contraction of the field, which is so common in the usual form (Pamphlet "Ophthalmic Notes," reprinted from "Dub. Quart. Journ.," May 1871).

DERMOID TUMOUR OF THE CORNEA.

Mr. Swanzy, in his "Ophthalmic Notes," reprinted from the "Dub. Quart. Journ.," May 1871, gives details of a case, with a lithograph of the appearances presented. The case was observed at

the hospital of the late Prof. von Graefe in Dec. 1869. Notes of the microscopical appearances are given by Dr. Leber, who had prepared them for von Graefe's use. The tumour was very large. It consisted of two portions, an anterior one of the size of a large cherry, and a posterior one less than half the same size. The two segments were connected by a narrow band. This peculiar shape was probably due to the constriction by the eyelids *in utero*. A few fine pigmentless hairs could be detected by the aid of a lens on the surface. Von Graefe removed the tumour. It occupied the whole depth of the cornea, and the globe was opened, a considerable portion of the vitreous escaping. The crystalline lens could not be found, and was thus shown to have been congenitally deficient. Microscopically, the tumour consisted of an external cutis-like layer, and beneath this of a thick layer of fat tissue, of which, in fact, the great mass of both segments consisted; and this tissue differed in no way from the usual subcutaneous fat. The cutis-like layer was formed of a superficial epithelial covering and of a layer of cellular tissue containing hair follicles, and very beautifully developed sudoriferous glands, the latter extending as deep as the fat tissue. There were few papillæ, and these were imperfectly developed. On the other hand, in some places, numerous and tolerably large vessels were observed. It was with difficulty that some minute rudimentary sebaceous glands were discovered in connection with the hair follicles, but the ordinary acinous, sebaceous glands were not present. The cornea, as such, was quite absent, but a thin layer of fibrous tissue, which occupied an analogous position, might be supposed to take its place. It could not be ascertained whether the tumour had caused arrest of development in the cornea, or whether the latter had been gradually destroyed by the growth of the tumour. A rudimentary iris lay close to the pseudo-cornea behind, so that there could have been no anterior chamber. Concerning the size of the globe, it was not possible to form an exact estimate, for it was at first so concealed by the tumour, and after the operation it became collapsed. It did not appear, however, to differ much from the normal size. That the name of dermoid is properly applied to this tumour, is evident from its minute structure. There is no reason why such tumours should not grow from the cornea as well as from the ovary, &c., but in the present case the deficiency of the lens suggested to Mr. Swanzy the query as to whether the invagination of the cuticle which usually occurs for the formation of the lens had not in this case been replaced by a bulging outwards. If so, the lens would not be formed, and there would have been no difficulty in imagining how such a growth as this may thus have had its origin. Ryba believed many of these cases to originate in arrested development of the eyelids. The eyelids were quite normal. Manfredi has published a case with microphthalmos,

but in this case there was no evidence of imperfect development of one part more than of another.

AN AFTER DANGER OF PERIPHERAL PROLAPSE OF THE IRIS.

Mr. Swanzy narrates three cases in which acute inflammation of the eyeball followed after slight injury, and in which there existed peripheral prolapse of the iris in consequence of a former injury. The first patient was a man, aged 40, admitted for purulent iritis of the right eye, attended by agonizing pain, of two days' duration. Twenty years before, the patient had received a perforating wound of the sclerotic, to the outside of the cornea, and distant about half a line from it. Prolapse of a portion of the iris into the wound occurred at the time. He had had no further injury, and the eye had not been troublesome till a few days before. He had been much exposed to the weather, and had had much fatigue. In spite of the treatment adopted, the eye became utterly lost.

The second patient was a man, aged 30. Eight months before, he had received a perforating wound of the right eye to the outside of the cornea, in the sclero-corneal junction. A portion of iris prolapsed into the wound. The eye had given the patient no trouble, and vision had been perfect. The day before admission, without any wound, or other immediate cause, the eye became irritated; towards evening this irritation became increased, and great pain set in. The next morning purulent iritis had already set in, and could be seen to be most intense towards the point of incarceration. The whole iris had, however, assumed a yellowish hue, and the aqueous humour was opaque. The perception of light was good. The eye became rapidly phthisical, and it was soon necessary to enucleate it in consequence of its fellow becoming sympathetically irritated.

The third patient was a man, aged 27. Ten days before, he had received a slight blow from the hairs of a horse's tail in this eye while stooping. He experienced much pain during the remainder of the day, and by the next day the eye was quite blind. On examining the eye, the pupil was found very much displaced upwards, in consequence of an old prolapse of the iris into an ulcer, at the upper sclero-corneal boundary. The great distension of the eyeball had now caused the cicatrix to gape. In the left eye there existed a similar condition of the iris and cornea. Two years before he had had an acute conjunctival blenorrhœa in both eyes, which had been the cause of the ulcers. In case 2, it was evident the inflammatory process originated in the iris at the place of incarceration. In case 1, the suppuration had advanced too far to make certain of this. In case 3, such an injury would never produce an inflammation of this kind in a healthy eye.

It would seem then—*a*. That the presence of a peripheral

prolapse of the iris renders the eye always liable to be suddenly attacked by a purulent iritis *foudroyante*; *b.* That the immediate exciting cause may be very slight, or even not discoverable; and *c.* That, in consequence of the great rapidity of the process, the prognosis of these cases is of the worst. It is not easy to understand why peripheral prolapse should expose an eye to such a danger. Is the proximity of the ciliary body somehow in play? It cannot depend on the tension and dragging of the iris, for in case 1, this was *nil*.

(Pamphlet reprinted from the "Dublin Quarterly Journal," May, 1871.)

RETINITIS PIGMENTOSA.

Mr. Thomas Windsor narrates the following case:—A gentleman, aged 30, complained that for some four or five years he had been unable to see, excepting in a good light. He could read during the day time with his right eye, when provided with + 12, No. 1, Jäger, from $3\frac{1}{2}''$ to $10''$, so that his central vision and power of accommodation were both good. An examination of the field of vision revealed a peculiar fact; measured at $14''$ distance by moderate gaslight, there was a small central portion extending $10\frac{1}{2}''$ horizontally, and $8\frac{3}{4}''$ vertically, in which he recognized a small piece of chalk; then, towards the temporal side, there was a space, $6\frac{1}{2}''$ wide, in which he still saw the movements of a hand; this was followed by an interval $13''$ wide, corresponding to which the retina was absolutely void of percipient power, and this, again, by another more than $27''$ wide, in which the *chalk* was again perceived. On the nasal side, the central field, in which the chalk was seen, was bounded by a sharply defined line, beyond which nothing could be seen for the distance of $10\frac{1}{2}''$, when again there was a space $4''$ wide, in which the *chalk* was well perceived. The ophthalmoscope showed, in the corresponding portion of the fundus, a zone of pigment spots, with multiple processes, just as in typical cases of retinitis pigmentosa. Within this zone the reflex of the fundus was of a reddish-grey colour, whilst at the outer side it had its usual red appearance. The disc was somewhat white, and the central vessels were rather small; there was around the disc a largish white ring, over which the smaller vessels made a very distinct bend. The principal colours were still recognized, though not, perhaps, so readily as by a normal eye. No cause could be assigned; his general health was good; he was tall, robust, and of good colour. He had smoked since the age of 13, and much since he was 18. His parents were not related. An able summary of published opinions and cases by Græfe, Mooren, Donders, Müller, Schweigger, and Leber is given, and then the author sums up to the effect that (1) in some, probably in many cases, the disease commences, and is probably located in the outer layers of the retina. That

(2) the disease is probably inflammatory in its nature, and that the inflammatory or nutritive processes in the adjacent portion of the choroid, the inner layers of the retina, the optic nerve, the vitreous, and the lens are secondary.

(Pamphlet reprinted from the "Manchester Medical and Surgical Reports," vol. i, 1870.)

ALBUMINURIC RETINITIS.

Dr. Argyll Robertson publishes a pamphlet on this subject, reprinted from the "Edinburgh Medical Journal," January, 1871. Until comparatively recently, defect of sight accompanying kidney disease was invariably attributed to uræmic poisoning of the nervous system. Now, although this is occasionally the case, as a rule the defect is due to organic retinal lesions. The symptoms are quite distinct (Græfe). Where the dimness of sight is due to uræmia, the amaurosis occurs, suddenly, reaching its height in several hours—in some cases in a few minutes—and the blindness is not unfrequently complete. Resolution occurs equally rapidly. In the other form, the sight may also become pretty rapidly impaired at the commencement, but thereafter progresses more gradually, and after increasing for several days remains stationary for a longer period. Very seldom does absolute blindness occur. Resolution, too, when it does occur, proceeds very slowly. Dr. Robertson then gives an account of the different appearances described by various authors, and the different opinions broached as to their causation. He details five cases which have occurred in his own practice.

The first patient was a woman, aged 17. The defect of sight had been noticed three weeks. There had been no general symptoms of kidney disease. On ophthalmoscopic examination, marked changes due to albuminuric retinitis were found. The urine was highly albuminous. She died, after some time, in an unconscious state, preceded and accompanied by convulsions of an epileptic character. No post-mortem was obtained. The second patient was a man aged 49, who for eleven weeks had suffered from vomiting, pains in the head, &c., copious micturition, and great thirst. Changes in each retina were found, and the urine was highly albuminous. He died in about five months with uræmic symptoms. The kidneys presented characteristic appearances of the contracting form of Bright's disease. The third patient was a male. Kidney disease had been previously diagnosed, and his symptoms dated back for two years; chiefly periodic headaches and vomiting. The fourth patient was a man aged 40, affected with chronic Bright's disease. The patient died, and waxy degeneration of the kidneys, liver, and spleen was found. A comparatively rare complication. The fifth patient was a man aged 28. His symptoms dated for two years;

cedema of the ankles, &c., and frequent micturition. He exhibited severe uræmic symptoms, but recovered for a time. A recurrence followed, and he died in a few weeks. The author summarises as follows:—1. That dimness of vision is a frequent concomitant of chronic Bright's disease; and that while in a few cases the defective sight may be attributable to uræmic poisoning of the nervous system, in the great majority of cases it is due to inflammation of the retina, attended with fatty degeneration.

2. That this disease of the retina presents such distinctive ophthalmoscopic appearances, as enable it to be at once, with certainty, recognized.

3. That this retinal affection is found most frequently to accompany the contracting form of Bright's disease, but, occasionally, also, the amyloid variety.

4. That not unfrequently, from the insidious progress of the disease, the affection of vision is the first symptom that obliges the patient to apply for advice, and that thus the ophthalmoscope may lead to the detection of previously over-looked kidney disease.

5. That, in a few cases, the diseased condition of the retina has been resolved, with restoration of function.

MELANOTIC CANCER OF THE FRONT OF THE CORNEA.

Dr. Hirschberg relates a case of polypoid, melano-carcinoma of the front of the cornea. V. Græfe was to have furnished the clinical details, as the case was under his care, but his lamented death prevented his doing so. Dr. Hirschberg speaks, therefore, from recollection only. The patient was a countryman of about fifty years of age, vigorous, and apparently in good health, who applied on account of a peculiar growth in his left eye of polypoid aspect, as black as ink in colour, and of the size of the knuckle of a finger. This projected forwards from between the lids, and, on account of its strange appearance, gave any one who had not seen it before an impression, at the first glance, that it was a foreign body rather than an organised structure. It was, however, firmly fixed to the cornea by a broad base, and did not allow the deeper parts of the eye to be seen. There were also found, on the ocular conjunctiva, two small, slightly prominent, black spots, and, on the reflected portion, there was also one dot, looking like a grain of snuff.

The tumour was removed by Prof. v. Græfe at the level of the cornea. It did not involve the deeper parts of the cornea, but passed somewhat into the middle of the sclerotic near the cornea. Every part was carefully removed, not excepting the little melanotic growths of the conjunctiva. The patient recovered well and quickly. The globe itself was intact. The amount of vision which was left was proportionate to the corneal

opacity. The chief tumour was about the size of a finger knuckle, and was fixed to the upper and inner part of the sclero-corneal margin, and to the greater part of the cornea, by a base 10 mm. (.4") in diameter; in the direction of the axis of vision it projected 12 mm (.48"); from above downwards it appeared somewhat flattened; in front of the palpebral fissure it spread out in an almost even surface 18 mm. (.72") in breadth and 8 mm. (.32") in height. The colour of the tumour was as black as ink on the side, on the anterior limiting surface, covered with a dry crust and slightly bloody, and on the cut surface at the base where the tumour had been removed from its source of origin. Only here and there, in the thin covering of connective-tissue, a few, small, white (fibrous) spots were seen. On the hinder cut-surface also the deep tint changed into a more greyish-black and striped shade.

The growth was of very soft consistence, each surface being moistened with "cancer juice." Teazed-out preparations, examined microscopically in a simple fluid in the recent state, showed that the tumour was made up (besides numerous blood-vessels and fibres of connective-tissue) of pigmented cells, showing all varieties of size, shape, and shade of colour. Irregular, polyhedral, or roundish cells, about 0.01 mm. (.0004") and upwards in diameter, and for the most part flattened, were especially numerous, and resembled, to a great extent, those of the choroidal epithelium. In the centre was a clear spot, resembling a nucleus, whereas at the periphery there was a dense collection of pigment granules. Where the pigmentation was only slight, the central nucleus could be distinctly seen, about 0.006—0.008 mm. (.00024" .00632") in diameter, as long as the cell lay on its flat side, but when the latter rolled over, presenting its edge to the observer, the nucleus disappeared. Besides these there were large and small, roundish, oval, spindle-, club-, pear-, and retort-shaped cells, showing great variety of shades of pigmentation; some having a well-marked nucleus, others none at all. Large, pigmented spindle-cells were seldom met with.

In addition, there were also spherical, spindle-shaped, and irregular cells, wholly free from pigment, sometimes of fairly considerable size, 0.02 mm. (.0008") in diameter and upwards, with a nucleus of 0.009 mm. (.00036"). The pigment granules appeared, when more highly magnified (Hartnack's immersion No. 9), as round, yellowish granules, almost of the tint of "red" blood corpuscles, and of about 0.0005 mm. (.00002") in diameter; although in many of the cells single large ones occurred of the diameter of 0.0036 mm. (.000144"). The first of these closely resembled the size of the pigment granules of the cells of the lamina fusca; the latter, those of the choroidal epithelium, according to Rosow (v. Græfe's Arch. ix, 2, 65).

The micro-chemical examination gave the following results:

—1. In weak potash solutions the pigment disappeared, showing analogy to hæmatin rather than to the so-called melanin; so that five fine slices, of the colour of ink, after soaking in a solution of potash (official) diluted with equal parts of water for 24 hours, became brown, and, after 48 hours, became yellow. Microscopic examination of these bleached slices showed that a large part of the cells had disappeared under the influence of the reagent: that in the remainder the pigment molecules had either wholly or in part vanished, or at any rate been much changed, and that of the protoplasm only an extremely fine, pale dotting could be recognized. 2. The addition of aqua chlori to the potash solution, with exclusion of the air, clearly accelerated the bleaching process, somewhat, but not materially. 3. Concentrated hydrochloric acid produced similar changes, but not any more quickly than the potash solution. 4. With the assistance of Herr O. Liebreich, it was demonstrated by Perls' test that the pigment contained iron.

Pencilled out sections of the tumour, after it had been moderately hardened in weak Müller's solution, showed that the structure of the tumour was of the alveolar type. With a low magnifying power, small and large roundish or oval spaces could be seen, from 0·06—0·12—0·24 mm. (·0024"—·0048"—·0096") in diameter, bounded by septa of connective-tissue, 0·03—0·06 mm. (·0012"—·0024") in breadth; sometimes completely, sometimes incompletely pressed against one another, and distended with heaped up, intensely black masses, which either partly covered up the margins of the septa, or were situated at a little distance therefrom. Here and there they had wholly fallen out of the alveoli. The black bodies appeared, under higher magnifying power, to be composed of pigment cells, of the form described above, closely pressed together, without any intercellular substance, mostly flat, and showing here and there a nucleus. The septa consisted of fibres of connective-tissue, arranged in bundles, and lying amongst them were widely separated oval or round nuclei. The general arrangement of the septa and intervening masses exhibited some resemblance to a hepatised lung, and especially so to a lung infiltrated with melanosis. The resemblance between the structure of a cancer and that of a hepatised lung was first pointed out by Virchow (Arch. Bd. 1, hft., 1, S. 95). In many of the preparations a decidedly nævus structure was visible, which occupied half the area of the section, and consisted of large and small strongly refracting blood-vessels, passing lengthwise and diagonally.

In addition to the chief tumour above described, there were obtained from the ocular and palpebral conjunctiva three roundish, melanotic, and slightly prominent patches (secondary collections). 1. From the upper part of the ocular conjunctiva a black speck, 2 mm. (·08") in diameter. 2. From the same

situation a larger patch of a brownish black colour, 8 mm. (.32") in length, and 3 mm. (.12") in breadth. 3. From the reflected portion of the conjunctiva a black dot, scarcely $\frac{1}{3}$ mm. (.013") in diameter. The undercut surfaces of all the conjunctival portions were uncoloured. Sections through the thickness of the first speck showed a collection of pigment cells in the lower layer of the epithelium, whilst the conjunctival and subconjunctival tissues showed no noticeable changes. At the border of the speck the epithelial covering did not measure 0.06 mm. (.0024"), and gradually thickened towards the middle, with a slightly wavy surface, to as much as 0.21 mm. (.0084"). So also the thickness of the layer of pigment cells increased from the circumference to the centre, from 0.018 mm. (.00072") to 0.15 mm. (.006"), therefore relatively thicker than that of the whole epithelial covering, and consisted in the first part of 2—3, in the last part of more than 20 layers of cells, somewhat irregularly placed one over the other. The inferior boundary line of the pigmented layer had a fairly straight course; the upper, on the contrary, was irregularly zig-zag; there were also in the upper, clear layer of epithelium, single, thickly pigmented constituents, and in almost all the cells there were at least single granules of pigment, and not infrequently they were arranged in a ring or crescent around the cell-forming nucleus. No special limiting membrane between the epithelium and conjunctiva could be made out. Single pigment cells (chiefly spindle-shaped) were clearly seen to lie amongst the uppermost fibrils of connective-tissue, and even to lie under the most superficial capillaries. The pigment layer was, however, essentially epithelial.

It is well known that pigmented cells are found in the epithelium of the conjunctival border, not merely in many of the lower animals, but also in many men (brunettes) as a normal condition. Further, there are present in the human conjunctiva, not very infrequently (and even in young individuals), large and small, brown, slightly prominent, fairly stationary patches, single or multiple, and chiefly situated at the sclero-corneal junction.

It is interesting that these innocent formations should represent in size and other respects the same structure as the small secondary deposits of melano-carcinoma; they owe their colour solely to a stronger pigmentation of the deeper layer of epithelial cells. This was found to be the case in a piece of conjunctiva (a line in length) removed by v. Graefe from a young girl; and also in a small speck, like a grain of snuff, which was excised from the right caruncle of a boy 15 years old (a brunette).

The foregoing case was very similar in the structure of the growth, but not in its clinical aspect, to one recorded by Langhans (*Arch. Bd. xlix, S. 117*). With reference to the literature of the subject of the new growths occurring at the sclero-corneal margin of the human eye, reference is made to Virchow

(Onkol. ii, 284); Hirschberg ("Medullary Fungus of the Retina," S. 82), and (Wiener Med. Rundschau, ix, iii, i, July, 1870); Classen (Arch. Bd. L. S. 56); and the author merely states that, apart from single dermoid tumours, melanoma simplex, &c., sarcoma (white and black) as well as epithelial cancer and melanocarcinoma have been met with. (Pamphlet reprinted from Virch. Arch. Bd. 51, with illustrations.)

REGENERATION OF THE EPITHELIUM OF THE CORNEA.

Following out some experiments of Arnold, of Heidelberg (noted in Virch. Arch. Bd. xlv), Dr. O. F. Wadsworth, of Boston, and Prof. C. J. Eberth, of Zurich, have made further investigations by acting on the cornea of frogs with cantharides or collodium. If cantharides be dropped on the cornea of a frog, the epithelium affected becomes immediately opaque, and after a short time may be removed as a continuous membrane. The authors prefer collodium as exciting less irritation. The cornea was then soaked for one or two minutes in a solution of one-fourth per cent. of nitrate of silver. By this means the dead epithelium was made to disappear, and the boundary line of the living epithelial tissue made distinct. A finely granular substance is afterwards seen in most cases to fill up the loss of substance in the cornea. According to Arnold this gives place to a homogeneous protoplasm, out of which the new epithelium arises.

The authors find it difficult to reconcile this assertion with the sharp boundary of the epithelium towards the granular substance. They have found, in the hyaline protoplasm, free nuclei and nucleoli, as Arnold states, but much more frequently with cells, on the immediate edge of the epithelium, which contain peripherally situated nuclei in process of division, but no free nucleoli. They consider that the epithelium grows at the edge of the loss of substance by increase in size and division of the marginal cells. The growth would seem, however, not to be limited to the margin alone, but also to take place in the continuity of the epithelium.

The process of nourishing the cornea in the lymph space under the skin of the frog, after the epithelium had been removed from a small space by the knife, gave them no satisfactory results. Arnold stated that islands of epithelium generally died. The authors came to the same conclusion when following out Arnold's plan, but by scratching the cornea with a sharp lancet in such a way as to leave islands of different shapes which have not been affected by any reagent (as was the case in previous experiments), they arrive at different results. Even small islands of epithelium, although situated at a considerable distance from the vascular system, continue to live. They produce new epithelium, even if somewhat more slowly than the epithelium remaining after central loss of substance; and the regeneration always takes place from the

epithelium, which had remained toward the defect. That amoeboid cells take part in the new formation they were unable to show. They made some experiments to try and prevent growth from the periphery after removal of epithelium. An epidemic among their frogs necessitated a conclusion earlier than they intended. (Pamphlet reprinted from the Boston Med. and Surg. Journ., vol. vi, No. 8, with eight illustrations.)

IDIOPATHIC WASTING OF EYEBALL.

Mr. Swanzy narrates a case in the "*Annales d'Oculistique*," Nov.—Dec., 1870, p. 212. He remarks that the name "*essential phthisis bulbi*" was applied by Prof. v. Graefe (*Arch. für Ophth.* xii, 2, p. 256) to a peculiar affection, of which the chief symptom is a sudden and considerable reduction of the tension of the eyeball, and is followed by a gradual return to the normal condition. There are no pathological changes at all to be detected in the interior of the eyeball. Only two cases have hitherto been published—the first by v. Graefe (l. c.), the second by Nagel (*Arch.* xiii, 2, p. 407). Von Graefe's patient was a countryman who had received a blow from the hoof of a goat, which had caused a small conjunctival cicatrix and occlusion of the inferior lacrymal canal. Nagel's patient was an individual on whom he had performed strabotomy. The present patient was a woman, *æt.* 37, on whom v. Graefe performed double cataract extraction on May 24, 1869. From the comparative youth of the patient, v. Graefe diagnosed some affection of the vitreous, and expected loss of vitreous at the operation. A notable quantity did escape from each eye, causing decrease of tension, which, however, in forty-eight hours completely passed off. There was no sugar in the urine. The patient did well, with the exception that in the wound of the left eye a semi-transparent substance was formed, such as in other cases, however, had caused no trouble whatever. As the patient had lost vitreous, she was kept in the dark for three weeks; access of light being then followed by irritation, the room was again darkened. On July 5th (six weeks after the operation) she complained of a feeling of fulness of the left eye, and she saw less distinctly with it. There was a small hæmorrhage in the anterior chamber. The tension was diminished ($-T^3$). The patient said she had not hurt herself, and as she was a very sensible woman the suspicion of a traumatic cause had to be dismissed, unless she had given herself a blow in her sleep. There were no other external symptoms to be detected. With the ophthalmoscope a large number of floating bodies were found in the vitreous; no other changes. The next morning (the 6th) there was a manifest improvement in the tension. In the evening it was only $-T^2$. The hæmorrhage in the anterior chamber had disappeared. On the 8th the tension was normal, and

there were no ophthalmoscopic changes. On the 9th the tension was about $-T^2$. By the 12th it had again become normal. On the 16th it was diminished; on the 17th, in the evening, had become normal, and remained so till the 23rd, when it was as low as $-T^3$, and remained so till the 27th. It then varied till the 31st, when it became normal, and remained so. On the 4th August the patient returned home. The tension was then normal. There were some floating bodies in the vitreous but no changes in the fundus, and the amount of vision in both eyes was the same. A letter from the patient's husband was received after a while, and it was stated that fifteen days after her return her eye became worse than it had ever been whilst she was at Berlin. She remained quietly in bed, and quite recovered. The author remarks that the most remarkable feature in this case, and in which it differed from the other published cases, consisted in the absence of any alteration in the shape of the eyeball. In both these an unevenness of Descemet's membrane was noticed, and a flattening of the globe in the situation of the recti muscles. In this case the cornea was clear, the pit produced by pressure of the finger was quickly effaced, and there was no neuralgia. The only persistent symptom complained of was a sense of fulness. This might be explained by the pressure on the ciliary nerves by the choroidal vessels engorged in consequence of the vacuum produced by the reduction of tension. Such an explanation would also account for the hæmorrhage into the anterior chamber, proceeding from a vessel supplying the iris. The cause of the changes in the tension was probably nervous. It could not depend on reflex irritation of the fifth, as the experiments of Donders (and others) have shown that this produces increase of tension. Irritation of the sympathetic produces decrease of tension. Unless we admit a primary central irritation of the sympathetic this will not help us, for we know of no means of reflex irritation by which the loss of tension could be produced. One other difficulty would still remain, to account for the condition of the vitreous. One cannot understand how so large a quantity of this could be absorbed and reproduced so quickly as to account for the rapid changes. Dr. Gouvéa has established by his experiments, and Prof. Iwanoff has confirmed the fact recently (*Arch. f. Ophth.*), that in all cases of extraction of cataract, accompanied by loss of vitreous, the latter separates from the retina and the intervening space becomes filled with a serous exudation, the vitreous not being reproduced. If this was what occurred in the above case, then there would be no difficulty in accounting for rapid changes in the amount of fluid within the eyeball. Separation of the vitreous may occur idiopathically and does so not infrequently, and, further, is compatible with a very satisfactory degree of vision. It is not improbable that an analogous separation occurred in the two cases previously recorded.

TANNATE OF LEAD IN THE OPHTHALMIA OF CHILDREN OF LYMPHATIC DIATHESIS.

Dr. Martin Schœnfeld advocates the employment of tannate of lead in a form of ophthalmia occurring in lymphatic children, probably a variety of strumous ophthalmia. Out of 585 persons who attended at his dispensary, 285 were children affected with this kind of ophthalmia. He uses the tannate of lead in the form of an ointment. The lead should be rubbed up in a mortar with some oil of sweet almonds or olive oil, as it sticks to the side unless this is done. A drachm and a half of the tannate is rubbed up with three drachms of oil and a drachm of fresh lard is added, the whole being well mixed. The ointment may be applied between the eyelids, or outside them, and is useful in ulceration of the cornea, as well as in ophthalmia and various other conditions ("Annales d'Oculistique," Jan.—Feb., 1871, p. 5).

DEFECT OF SIGHT IN LEUCOCYTHEMIA.

M. Maurice Perrin (Soc. Imp. de Chir., 30th March, 1870) has called attention to the defect of sight met with in a case of leucocythemia. The patient complained of a mist before his eyes. The field of vision was contracted from the periphery to the centre, principally on the left side. Ophthalmoscopic examination showed the fundus covered with effusions of blood, or with small hæmorrhagic spots of a bright red, resembling the intestinal villi injected and contrasting with the chamois-yellow of the fundus. Post-mortem examination verified these appearances, but the colour of the blood had become brownish ("Annales d'Oculistique," Jan.—Feb., 1871, p. 69).

OPERATION FOR ENTROPION.

M. Durand describes a modified operation for entropion ("Gaz. Méd. de l'Algerie," 1870, p. 74). Having closed the patient's eye, trace a line with ink or nitrate of silver transversely across the eyelid, dividing it into two parts. (This line is not, however, indispensable.) Pinch up a fold of skin of this eyelid between the two first fingers of the left hand, and by a gliding movement push back the tarsal cartilage. Take a pin in the right hand and make it traverse the base of the fold of skin still held by the left hand, in such a manner that its point of entrance shall be on the black line which was traced, and its point of exit on the line of eyelashes, or as near to it as possible. Insert two other needles, one on the inside, the other on the outside of this one at a distance of four lines from one another. Wait till the fold of skin be a little swollen, and then remove it with scissors.

A twisted suture should then be used in such a manner that as the thread brings the lips of the wound together it will also bring the two outside needles nearer to the middle one. The lower eyelid should be protected by a piece of strapping. After three days the suture may be removed. The operation leaves no visible trace, and the presence of the pins guards the tarsal cartilage. A case is narrated. Dr. Warlomont remarks that this operation is not new, but it offers a very important modification. The excision of a portion of the lid has often been practised in similar cases, but in an uncertain manner, sometimes too much and sometimes too little being taken. The surgeon can shape the piece removed at will, and thus raise the eyelid as much as he wishes. The cut of the scissors is made with precision, the eyelid not being stretched, and lastly the two lips of the wound are brought together very regularly (*"Annales d'Oculistique,"* Jan., Feb., 1871).

DEAFNESS IN RELATION TO VASCULAR KERATITIS AND CONICAL
INCISOR TEETH.

Dr. Davidson communicates a paper on this subject to the *"Annales d'Oculistique"* (Mars-Avril, 1871, p. 125). The greater part of the cases occurred in subjects between the ages of 11 and 16. None were younger than 8 or older than 18. The greater number were of the lower class, ill-lodged, ill-clothed, ill-nourished, and exposed to bad atmospheric conditions. The only exceptions occurred in individuals suffering from some uterine disorder or legitimately suspected of syphilitic impregnation. The place of habitation exercised a great influence on the development of the malady. Nearly all the patients came from the sea-shore, and especially from situations exposed to the east wind, which entails as nearly constant effects, dampness and extreme cold, continuing severely nearly the whole winter. With the exception of one case, that of a boy 8 years old, all the patients were girls. This circumstance, joined to that of the particular age of the patients, leads to the question whether the development of the genital organs has not a great influence. Two cases are cited in support of this hypothesis. The first is that of a young woman of 16, in whom an accidental suppression of the menses was followed by laryngitis, accompanied by head symptoms, which disappeared unexpectedly at the same time that an affection of the cornea and deafness supervened. With appropriate treatment the constitutional symptoms diminished and the health became re-established, the cornea however remaining so opaque that the patient could not see her way about, and the hearing was affected so far that she could only hear a watch at an inch distance on one side and on absolute contact on the other side. A local and constitutional treatment with mer-

cure was adopted, the result being that the corneal opacity of the right eye diminished sufficiently to allow of a large iridectomy being performed. The effect was excellent, and, most remarkably, as the sight improved so also did the hearing on the same side; a watch could be heard at eight inches. The same treatment being adopted with reference to the other eye was followed by the same improvement, and the patient was able to resume her occupation, that of a seamstress. The second patient was 15 years of age. She was suffering from amenorrhœa. On one side a watch could not be heard at all, and only on absolute contact on the other side. Mercurial treatment and iridectomy having been adopted was followed by the same success as in the other case. With reference to the aural changes, it is stated that in some of the cases only was the Eustachian tube affected; in all the membrana tympani was involved on both sides. In the first period the membrane, more vascular than ordinary, was of a rosy-grey colour. In some cases this vascularity extended further into the auditory canal, and probably a similar condition of the Eustachian tube existed at its internal or tympanic opening in those cases in which it was affected. Later the redness vanished, but the membrane remained thickened, became of a white colour, dull and void of elasticity. As it did not admit of being set in vibration by the undulations of the air, it resulted that the hearing was defective.

Just as iritis nearly always exists in connection with the corneal affection, so also the Eustachian tube is very frequently involved. The change not being limited to congestion, but consisting in effusion diminishing the calibre of the tube, and was in proportion to the tympanic symptoms. The prognosis is always unfavourable. The case in which indectomy was followed by almost complete recovery of the hearing must be looked on as a fortunate coincidence. The syphilitic origin of this curious affection could only be established in 20 per cent of the cases.

EMPLOYMENT OF ALUMINIUM PLATES PLACED BETWEEN THE EYELIDS AND THE EYEBALL.

In the "*Annales d'Oculistique*" (Mars—Avril, 1871, p. 188) is a note by Dr. G. Albin on the use of metallic plates in the treatment of staphyloma, &c., placed between the eyeball and the lids. Pressure is kept up by means of a bandage. The good effects which he met with induced him later to employ a plate perforated with a small hole in cases where one part of the cornea was still transparent. The hole, being placed over the transparent part of the cornea, answered perfectly. Aluminium was chosen because of its lightness, its malleability, and its hardness. On account of its fusibility it will not take colours so as to make

artificial eyes of it, but the author hopes to overcome this difficulty by-and-bye. According to M. Albini, one can profitably use the plates under the following circumstances:—(1) To protect the ocular conjunctiva from caustic remedies and as a means of employing pressure (in trachoma, &c.) on the inner surface of the eyelids. (2) To protect the ulcerated cornea and favour cicatrization. (3) They can be used as substitutes for artificial eyes without previous operation, and might be used instead of glasses by inserting small quartz lenses in holes in the plates. (4) They can be used to direct electric or thermal currents over the eyes.

PIGMENT OF IODINE AND MORPHIA.

M. Warlomont recommends a pigment composed of iodine and morphia to be painted around the orbit and on the temple to relieve pain in eye affections. The painting is repeated morning and evening, or oftener. When the epidermis peels he applies a rice poultice. The paint consists of about three grains of acetate of morphia (20 centigrammes) and a drachm of tincture of iodine (4 grammes).—"Annales D'Oculistique," Jan.—Fev., 1871, p. 91.

LANCE-SHAPED KNIVES FOR IRIDECTOMY.

M. Warlomont prefers lance-shaped knives (modifications of M. Weber's) for iridectomy. Figures are given. ("Ann. D'Ocul.," Jan.—Fev., 1871, p. 93).

MEANS OF WITHDRAWING PINS USED FOR SUTURE.

In order to avoid the traction which is generally made on the edges of a wound while withdrawing pins, M. Warlomont adopts a plan mentioned to him by M. Desmarres. He throws a loop of thread over the end of the needle by which he means to make traction, then drawing on the needle with one hand he steadies the ends of the loop with the other, and thus fixes the edges of the wound and prevents their being separated. ("Ann. D'Ocul.," Jan.—Fev., 1871, p. 94.)

COLOUR BLINDNESS.

Dr. X. Galezowski has continued his researches as to the effects of diseases of the eye on the perception of colours, and publishes some observations in the "Annales D'Oculistique," Mai—Juin, 1871, p. 221. In his work on the diagnosis of diseases of the eye by means of the perception of colours by the retina, he has published a chromatic scale composed of eleven chromatic "gamuts" corresponding to the principal colours accepted by

M. Chevreul, and of which the latter has constructed his circles and "gamuts" of colour. The colours and their "gamuts" follow in the order of the solar spectrum. Each colour is divided into four shades taken at equal distances from the "gamuts" of M. Chevreul. This arrangement not only allows of each colour being distinguished separately, but also of the appreciation by patients of the simultaneous or successive "contrast" of colours. The author discusses the different methods adopted by different authors, such as the use of coloured papers, &c. Each method having various objections which are obviated in his plan. In his work he thinks he has published too many gradations of colour. Now he divides a sheet of black paper into an upper and a lower half, each again subdivided; in the upper subdivisions are placed the principal colours; in the lower the gradations of these colours. Red, orange, yellow, green, blue, and violet, are the colours employed, and two shades of each are given. He obtains these colours by directing solar light into a dark chamber, and reflecting it by a mirror on a prism constructed of hollow glass filled with bisulphide of carbon; the resulting spectrum is large and very bright, and having well-defined the limits of the principal colours, he selects coloured papers representing the same exactly, and then pastes them on his sheet of black paper. The secondary gradations are in accordance with "gamut" No. 5 of M. Chevreul's scale.

The result of the examination of 766 patients suffering from alterations in the fundus oculi has been to establish three varieties of chromatic defect—

A. *Morbid "Contrast of Colours."* B. *Colour Blindness.* C. *Scotomata for Colours.*

A. The name "contrast" of colours has been given to the mutual opposition between different colours when seen together, or when seen successively, by which a mixed tint (complementary colour) is produced unlike either of those looked at. This physiological phenomenon is met with, under exceptional circumstances, in healthy eyes, but analogous phenomena result from the morbid conditions brought about by the abuse of alcohol. The impression produced on the retina by one colour remains too long, so that another cannot be seen properly till a considerable interval has elapsed. After the patient has shut his eyes for a while he can tell any colour well. If such a patient be told to look at several colours at once he will see nothing but confusion, though he will be able to recognize any one separately. B. Colour blindness. 1. In optic atrophy. This is the disease in which colour blindness is most frequently met with. Of 156 patients with optic atrophy 66 were unable to detect one or many colours, or even any at all.

Green is the first colour which fails to be recognized and afterwards red. Nearly all patients suffering from progressive atrophy take the green for grey, and as the malady advances, the red becomes less and less perceptible, changing into brown, and then into black. Blue is perceived for a very long time, and yellow is detected almost as long as the patient can see light. As the yellow occupies so large a part of the solar spectrum it may also have a larger surface than the other colours in the retinal cones, so that, though they are atrophied, they still perceive the yellow. The author has only met with total colour blindness in two cases. The atrophy, consecutive to neuritis or neuritis itself, more rarely gives rise to colour blindness. Alcoholic amblyopia may produce complete colour blindness, or only for a certain colour, and the blindness varies from day to day; green is generally confounded with grey. Glaucoma gives rise to colour blindness only exceptionally. 2. Hysterical amblyopia. Cases of this affection are given, and an account of the effect on perception of colours. One fact noted is that in all the cases, besides the loss of perception of yellow and blue, all the others cease to be seen; often, even, the patients cannot tell black and white. 3. Optic neuritis, hemiopia, and different varieties of cerebral amblyopia. These are generally exempt. The loss of the faculty of distinguishing yellow indicates most frequently a syphilitic cause, and the neuritis is then accompanied by choroiditis or retinitis. 4. Albuminuric and glycosuric retinitis. Colour blindness, in these cases is very inconstant. 5. Congenital retinitis pigmentosa. This does not habitually lead to colour blindness. 6. Syphilitic choroido-retinitis. This is one of the affections which most frequently leads to colour blindness. The colour generally mistaken is yellow. Blue and green are also very frequently not recognized. The explanation of these phenomena is to be looked for in the wide-spread inflammation of the whole retina and choroid at once. Partial syphilitic inflammations of the retina, as well as certain forms of choroiditis do not produce any chromatic defect. C. Central scotomata for colours. This variety is probably due to alterations of the yellow spot, and in certain cases to atrophy of the optic disc. Apoplexies, on the yellow spot, lead to temporary or permanent loss of central perception of colour. In ten cases of idiopathic retinal hæmorrhages, the patients could not perceive any colours when they looked straight at them, but when they looked with the lateral portions of their retina, they could detect the principal colours without difficulty. Detachment of the retina, not materially affecting the sight, does not affect the perception of colours. In a certain number of cases the patients have complained that either before or very soon after the occurrence of detachment of the retina, they have, for days or weeks, or even longer, seen every object coloured blue or violet. The light of a candle or of the gas seemed to them to be a fine blue colour, such as azure or ultramarine blue.

SYPHILITIC AMBLYOPIA AND AMAUROSIS.

Dr. X. Galezowski has written on this subject in the "*Arch. Gén. de Méd.*," Jan., Fev., Mars, 1871, pp. 120-184. His conclusions are given as follow, in the "*Annales d'Oculistique*," Mai-Juin, 1871, p. 287. 1. Syphilitic retinitis and neuritis may exist without any choroidal changes, and most frequently the retinitis is attended with extravasation and exudation. These cases are, however, exceptional. 2. Syphilitic retinitis presents no pathognomic signs by which one can distinguish it from other kinds of retinitis. 3. If the retinitis or optic neuritis be accompanied by iritis or choroiditis with or without floating bodies in the vitreous, there can be no doubt that the affection is syphilitic. Experience has shown that no other affection, with the exception of glaucoma, can give rise simultaneously to retinal apoplexies, and to iritis or choroiditis. 4. Defective perception of colours is constant in both forms (retinitis and neuritis), but especially so in the latter. 5. The most efficacious treatment consists in the administration of iodide of potassium, and of corrosive sublimate in large doses. 6. Syphilitic choroiditis is one of the most frequent forms, and has pathognomonic symptoms. These are (1), defect or loss of sight, aggravated at times, the periods of exacerbation being often separated by wide intervals; (2) a mist in the form of a cobweb constantly before the eyes; (3) very frequent flashes of light; (4) photophobia; (5) hemeralopia at a late period; (6) continuance of central vision whilst the field is diminished at the periphery; (7) hazy optic disc; (8) retinitis pigmentosa, coming on at a late period; (9) atrophy of the central vessels of the optic disc, with preservation of the rosy tint due to the cerebral vessels, or those that supply the optic disc. 7. Retinitis pigmentosa very often is developed in the course of syphilitic choroiditis. 8. The pigmentary patches in syphilis are arranged along the retinal vessels, but they form, in addition, circular circinate masses, in the form of herpes circinata. 9. Pigmentary retinitis from acquired syphilis only differs from the congenital form, that is, the form we at present consider due to consanguineous marriages, by the circular form of the pigmentary spots. 10. Pigmentary congenital retinitis is an hereditary syphilitic affection. 11. It should be combated by treatment with mercury or with the iodide, from infancy. Beyond a certain age, the progress of the disease cannot be arrested, and it eventually leads to loss of sight. 12. Children born of syphilitic parents ought to be examined ophthalmoscopically from birth, and when retinitis is once recognized it ought to be treated as indicated above.

MYXOMA OF THE OPTIC NERVE.

Dr. A. Sichel writes at length on tumours of the orbit, and narrates a case of myxoma of the optic nerve in the "*Gaz. Hebdomadaire*," Nos. 8 and 9, 1871, Mars 24 et Avril 7. The remarks on myxoma and the narrative of the case are given fully in the "*Ann. d'Oculistique*," Mai—Juin, 1871, p. 279. The patient was a girl, *æt.* 16. When she was seven years of age her left eye began to protrude. For three years the eye had been blind, and had projected considerably. Several punctures had been made into the swelling causing the exophthalmos, but only a turbid watery fluid escaped. When the patient came under observation the eye projected in such a manner that the posterior part of the eyeball corresponded with the superior margin of the orbit. A certain amount of mobility remained. The anterior chamber was markedly diminished in depth by bulging of the iris forwards. The pupil acted in sympathy with the other, but not independently. The cornea was transparent, and the eyelids still covered the whole of the prominent eyeball. Examination with the finger beneath the upper eyelid detected an elastic, semi-fluctuating tumour behind the eyeball. No pulsation could be felt. No pain was caused by the examination. The eyeball was exceedingly hard (glaucomatous). The optic disc was white and atrophied. There was no evident trace of past neuritis. The right eye was quite normal. The question of the diagnosis is considered in detail and a case reported by v. Graefe alluded to. Excision of the tumour was advised and consented to. An attempt to save the eyeball having failed, the whole contents of the orbit were removed, and the optic nerve divided as far back as possible. The patient made a good recovery. On examining the specimen afterwards, the optic nerve and its sheath, where cut across, were found to be healthy, but the substance between these had the appearance of gelatine. The tumour was the size of a large hen's egg, and consisted of two portions; one was composed of lobules of fat, representing the normal retro-ocular cushion; the other was situated in the centre, lobulated, and distinctly limited from the neighbouring parts. The colour was of a slightly rosy-grey tint, and its consistence that of a strong solution of gelatine. Pressure caused a viscid, glue-like fluid to exude. The optic nerve could be traced into the substance of the tumour, and its fibres became separated by the growth. The fluid which exuded from the tumour was turbid, and of a dirty greyish-yellow colour, viscid in consistence, so that it could be drawn out between the fingers. Microscopically, cells of various shapes were found, some of them being large and round, and each containing a large nucleus. Some were star-shaped, and others fusiform. All the cells were irregularly disseminated through the mass, and had no common orderly arrangement. The tumour itself showed an

abundant fibro-cellular network, its meshes being filled with the same cellular elements as those in the fluid, with the exception that the round cells were much more numerous. There were also numerous, very brilliant fibres, reflecting light strongly, and like those of connective-tissue. They were united together, but not in such a manner as to constitute a true network. In various parts the round cells had undergone fatty degeneration. At the part where the nerve seemed to disappear in the tumour, the nerve fibres could not be traced. In parts, they were well-defined; in others they seemed to pass insensibly into the connective-tissue fibres. Where the nerve was spread out by growth between its fibres, the elements of the tumour were seen to spring from the neuroglia. The growth was clearly a myxoma—a *myxoma hyalinum sive gelatinosum*, which in parts passed into the condition of *myxoma lipomatodes*. A detailed account of the condition of the different structures of the eyeball is given. The operation was performed in the month of July, 1867, and in the month of August, 1870, no return of the growth had occurred, and the other eye remained good.

GLAUCOMA.

Dr. A. Sichel contributes a paper on glaucoma to the "Annales d'Oculistique" (Juillet—Août, 1871, p. 19), in which he calls particular attention to the presence of a serous sac, as demonstrated by Schwalbe, within the eyeball, and which he thinks plays an important part in the production of the symptoms. He gives a very interesting summary of the literature of glaucoma, and then narrates the following experience of von Graefe. Graefe had operated on an officer affected with glaucoma, and while riding with Dr. Sichel afterwards in a cab with the windows shut, his attention was attracted by the iridescent appearance produced around a gaslight, seen through the steam on the glass, and he exclaimed that that was just what a patient suffering from glaucoma saw. When the patient had sufficiently recovered, they took him with them in a cab, and directed his attention to a gaslight seen through the misty window; the officer at once imagined that his glaucoma had returned, and not only in the eye operated on, but also in the other. It was considered that the symptom of the presence of "halos" proved clearly that there is present in the glaucomatous eye a product analogous to watery vapour, which disappears after iridectomy. Graefe does not appear to have made further use of this observation. Dr. Sichel then gives an analysis of a paper by Schwalbe in Max Schultze's "Archiv. für Mikr. Anat.," 1870, in which the author argues that there is a serous or lymphatic sac situated between the choroid and the sclerotic. Dr. Sichel accepts this discovery

as proving how sagacious von Graefe was in classing glaucoma as a choroiditis with effusion. At first sight, however, the premonitory symptom of rapidly increasing presbyopia appeared to Dr. Sichel to militate against such an explanation, but he has convinced himself that the contradiction is only apparent. He discusses the bearing of each premonitory symptom. 1. The presence of iridescent circles. These are well accounted for by the occurrence of a serous effusion, which would play the part of the steam inside the window of the cab mentioned above. 2. Sudden and rapidly increasing presbyopia. If the choroid were separated from the sclerotic by effusion, one would imagine that myopia would be produced, as the choroid would be stretched, and the curvature of the posterior surface of the lens exaggerated. It must be remembered, however, that the premonitory symptoms generally came on at night, when the accommodation is at rest. It is when the patients wake in the morning that they find changes have occurred in their power of vision, and under such circumstances one need not be surprised to find that compression or detachment of the choroid should paralyse the accommodation. There are muscular fibres in the choroid itself, whose contractility would be interfered with by the compression; so also would that of the ciliary muscle. The ciliary nerves, too, would be directly interfered with, either by the fluid itself, or by their being compressed in the sclerotic. 3. Diminution of the field of vision is explained by compression of the ora serrata of the retina. 4. The spontaneous arterial pulsation has been already explained by von Graefe. 5. Slight and temporary alterations of vision are sufficiently accounted for by the very slight effusion of fluid. Similar effects can be produced on one's own eye by compressing the globe all round very gently with several fingers at once. Acute glaucoma, at its commencement, consists only in the periodic effusion of a variable quantity of fluid, followed by complete absorption, causing stretching of the ciliary nerves, and neuralgia of the fifth pair of nerves. To this stretching soon succeeds compression, anæsthesia of the cornea, and paralysis of the iris. Chronic, inflammatory glaucoma is explained by the sudden effusion of fluid, not followed by complete absorption, but by successive additions. Chronic simple glaucoma, is caused by slight and continuous effusion. Glaucoma *fulminans* is due to the sudden effusion of the greatest possible amount of fluid. The frequency with which glaucoma occurs consecutive to other conditions has hitherto been a mystery, but is easily explained by the present theory. Most important of all, the action of iridectomy is at once evident. It is equivalent to tapping in pleuritic effusions. Iridectomy is brilliantly successful in acute glaucoma, but in the chronic form a second operation is often required. So much so, that Coccius has recommended that a portion of iris be left included in the lips of the wound instead of performing iridectomy.

In Dr. Sichel's opinion, the sole action of iridectomy is the evacuation of the fluid effused, and it is entirely analogous to thoracentesis. Consequently, the operation is of the more value the earlier it is practised; the nearer the line of sclero-corneal incision approaches the extreme limit of the anterior chamber; the larger the portion of iris excised, and the further back the excision is carried towards the ciliary attachment of the iris. In Coccius's plan, the piece of iris in the wound may act by capillary attraction. Quaglino has published a number of cases in which simple peripheral incisions, without iridectomy had been successful.

LATERAL EXTRACTION OF CATARACT.

M. Galezowski writes ("Gaz. des Hôp." 1871, p. 142) on a new proceeding for the extraction of cataract. His plan is to make a semilunar incision in the sclero-corneal border at the external margin of the cornea, and prolong it a certain distance beneath the conjunctiva: the corneal flap thus made is terminated by a band of conjunctiva, which facilitates union by first intention. He employs a special knife, which, towards the point, is slightly curved, like a pruning knife. The advantages are considered to be that the wound is corneal, and the conjunctival margin of the flap tends to quicken union; that the wound is at the outer part of the cornea, where escape of vitreous is least likely to occur, and the speculum can be kept in during the whole operation; that it is easier to use instruments; that the incision can be made with the greatest ease with the modified knife, which is bent (on the flat) to allow of its being used in deep set eyes; and that the curve near the point allows of the finishing cut being made more easily. ("Annales d'Oculistique," Julliet—Août, 1871, p. 102.)

EXOPHTHALMOS DEPENDENT ON A VASCULAR TUMOUR OF THE ORBIT.

M. Galezowski has written at length ("Gaz. des Hôp." pp. 237, 241, 245) on exophthalmos produced by vascular tumours of the orbit. His narrative of the case which gave rise to his remarks is given fully in the "Annales d'Oculistique," Juillet—Août, 1871, p. 104. We abstract the following:—The patient was a woman aged 42, who came under care February 17, 1871, on account of prominence of the left eyeball. Three years and a half previously the patient had fallen in the street, and had received a wound at the margin of the left orbit. She suffered no inconvenience till six weeks before admission, when she awoke in the morning with headache, which lasted the whole day, accompanied by nausea. In the evening she vomited, and after-

wards heard a kind of "see-saw" noise in her head and in the eye. The next day the eye was half closed, and three days later it had become swollen, and quite closed. For the first fortnight she could not see well with the right eye, and could not distinguish the clock. When seen, the left eyeball was very prominent and motionless, the upper lid was paralysed, the lower part of the conjunctiva was much swollen, and encroached on the cheek. The pupil was not dilated, and the amount of vision was good. There was no optic neuritis. There was great pain in that side of the head day and night. A bruit could be heard over the region of the ear, the eye, and indeed over the whole head. Pressure on the carotid checked the bruit, &c. Pressure over the eye by means of a bandage was advised. At the end of a month, compression of the globe was added by means of charpie and graduated pressure. At the end of five weeks from the patient's admission there was exophthalmos, a (chiefly) diastolic bruit heard in the cranial region, and over the right carotid a continuous harsh double bruit. Recollecting the fatality of ligature of the carotid in such cases, M. Galezowski determined on trying compression. This was practised for fifteen or twenty minutes every two or three days. This was afterwards increased to forty-five or sixty minutes daily. Marked relief followed, and at the end of a month the movements of the globe had returned, the eyelid was raised, and the swelling had gone. In the month of April the treatment was interrupted for a fortnight, and then continued every two or three days till July. At the commencement of August the protrusion had almost entirely disappeared, the patient heard no bruit, and on auscultation none could be heard over the cranium. The treatment had not been discontinued when the note was published.